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ABSTRACT

These units of instructional materials and teaching aids are part of a series of eight designed for use in rural agriculture programs for students in grades 9 and 10. Covered in the unit on livestock science are understanding the livestock industry, identifying breeds of livestock and poultry, selecting livestock, and feeding livestock. Identifying crop and weed seeds, judging the quality of grain for seed and for market, growing corn, and growing soybeans are discussed in the unit on crop science. Each of these units or problem area packets includes some or all of the following components: suggestions to the teacher, a content outline, a teacher's guide, information sheets, student worksheets, assignment sheets and keys, demonstrations, job sheets, transparencies, a discussion for the transparencies, and sample test questions and a teacher's key. (The remaining units are available separately--see note.) (MN)

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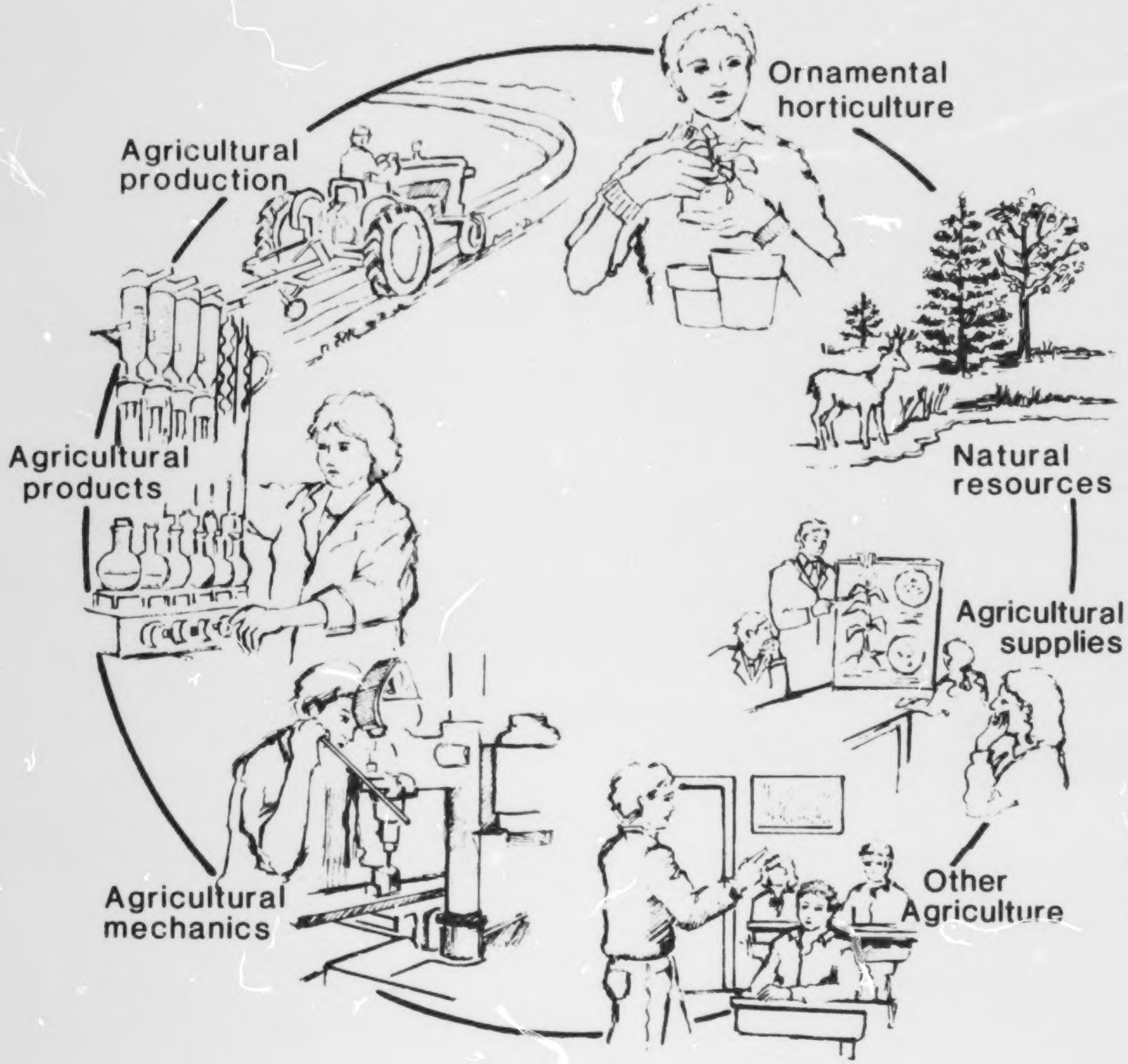
Core I Materials for Rural Agriculture Programs

Illinois
State Board of
Education

Adult
Vocational and
Technical Education



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LIVESTOCK

UNIT D: Livestock Science

PROBLEM AREAS:

1. Understanding the livestock industry
2. Identifying breeds of livestock and poultry
3. Selecting livestock
4. Feeding livestock

UNIT D: LIVESTOCK SCIENCE

PROBLEM AREA: UNDERSTANDING THE LIVESTOCK INDUSTRY

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is during the fall semester. The estimated time for teaching this problem area is 2 to 4 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. The livestock industry is a major component of the total agricultural field.

2. Students need a basic understanding of the history and trends of the livestock industry to make sound decisions on the purchasing, managing, and selling of livestock and livestock products.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

These materials were developed through a funding agreement R-33-21-D-0542-388 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide and worksheets were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and test questions were prepared by Vocational Agriculture Service, University of Illinois. The information sheet on Purebred Membership was used by permission of the National Society of Livestock Record Association.

The information sheet "The Livestock Industry in Illinois," was developed by Jerry Pepple from material prepared by the Illinois Cooperative Crop Reporting Service. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Livestock science

II. Problem area: Understanding the livestock industry

III. Objectives: At the close of this problem area students will be able to:

1. List and describe the agriculture jobs which are associated with the livestock industry.
2. Write a brief description of the history of the livestock industry in Illinois and its effect on the economy.
3. Describe the basic trends in the livestock industry in the local community and in Illinois.
4. Define the basic terms used in the livestock industry.
5. Select various livstock enterprises for their S.O.E.P.

IV. Suggested interest approaches:

1. Promote class discussion and motivation by asking the following questions: "How many of you like steak or pork chops?" "How many have meat at each meal;" "Why?" "What meat was served at your Thanksgiving dinner?" Lead the discussion toward the importance of livestock and meat in our everyday lives.
2. Take a field trip to a livestock operation or show a film relating to some area of the livestock industry.
3. Invite a guest speaker who is employed in the livestock industry to the class to explain such things as educational requirements, skills openings available, salary ranges, and advantages and disadvantages of his/her position.
4. Discuss the uses and economic values of livestock to people: pleasure, medical research, recreation, food.
5. Ask the following lead questions to promote class discussion. "How many have livestock for their 4-H or S.O.E. projects?" "Why did you select a particular type?"

V. Anticipated problems and concerns of students:

1. What occupations are available in the livestock industry? (Local, state, nation)
2. When did we first start using and domesticating animals?
3. What are some ecology problems with livestock?
4. What are the trends in the livestock industry in this area? In the state? In the nation?
5. Why do we eat meat and not just vegetables?
6. How much meat is consumed annually?
7. What is a livestock-production cycle?

8. What are some common livestock terms used in this industry?

9. What are the major livestock enterprises in Illinois?

10. How many head of beef, swine, sheep, dairy, and poultry are in Illinois?

11. What are the major uses and value of livestock in Illinois?

12. Why should I have an S.O.E. livestock project?

VI. Suggested learning activities and experiences:

1. Conduct a supervised study and discussion period to determine tentative answers to the problems and concerns listed by the students.

2. Have students construct a bulletin board on the livestock industry emphasizing occupations within the industry.

3. Provide students with information about the livestock population and livestock trends in Illinois, using county census data and the information sheets and transparencies.

4. Have students conduct a survey of the kinds and numbers of livestock in the area. By using the county census, determine trends in the local community and compare these with the state trends.

5. Conduct an occupational search for specific jobs in the area and state that relate to the livestock industry. Have students write a letter to a Livestock Breed Association and ask for career information and free publications concerning purebred livestock.

6. Complete Student Worksheet 1, "Understanding the Livestock Industry," and collect for evaluation. Use VAS Units 1029a, 1031a, 1056, and 1057, and the information sheets.

7. Have students prepare a 3–5 minute talk on a specific breed of livestock which they would select for their S.O.E.P.

VII. Application procedures:

1. The purpose of this problem area is to introduce the student to the livestock industry in the local community and Illinois.

2. This problem area should also illustrate the relationship the S.O.E. livestock projects have to the classroom instruction in how to identify and solve problems concerning the livestock industry.

VIII. Evaluation:

1. Collect and grade Student Worksheet 1.

2. Evaluate students participation in classroom discussion and other activities.

3. Administer and evaluate an exam on the livestock industry.

IX. References and aids:

1. County Livestock Census Data, Illinois Cooperative Reporting Service, Springfield, IL.

2. VAS Unit 1029a, "The Swine Enterprise," Vocational Agriculture Service, University of Illinois.

3. VAS Unit 1031a, "The Sheep Enterpirse," Vocational Agriculture Service, University of Illinois.

4. VAS Unit 1056, "The Beef Breeding Enterprise," Vocational Agriculture Service, University of Illinois.

5. VAS Unit 1057, "The Feeder Cattle Enterprise," Vocational Agriculture Service, University of Illinois.

6. Information sheets.

7. Student Worksheet 1, "Understanding the Livestock Industry."

8. Transparencies and Discussion Guide.

9. Suggested Test Questions and Teacher's Key

INFORMATION SHEET

1979 MEMBERSHIP OF THE NATIONAL SOCIETY OF LIVESTOCK RECORD ASSOCIATIONS

WITHOUT A REGISTRATION CERTIFICATE JUST ANOTHER ANIMAL

Some folks seem to get the idea that purebred livestock breeders sometimes get a little overzealous about the value and importance of the registration certificate in purebred livestock improvement.

But look around at what has happened over the years. Study the history of progress among the world's livestock. There is no denying that purebreds have played a major and vital role in that progress.

With greater knowledge of genetics and how to utilize this knowledge in developing mating and crossing systems the results have been tremendous but these results have brought about a tendency for some to forget the part the purebred played in all this progress. Actually all this makes the purebred all the more important.

But, what is a purebred? How do you know an animal is a purebred? Yes, this purebred is an animal bred and produced by making various matings of animals of known ancestry. What is known ancestry? To know this ancestry somebody has to keep records. These records start with the breeder and his records are as good as his honesty and integrity.

The breeder simply can't do the whole job. He is limited as to the records he can keep up with over a period of time. That's where the livestock registry comes into the picture with a protected and officially issued pedigree. Without it the livestock industry would be at the mercy of the unscrupulous. This has been demonstrated time and time again. This was the origin of livestock record associations. They are a must.

So when do you own a purebred? When you have been issued an official registration certificate for that animal. The animal may be good or inferior and some types of such certificates may help you know about this but without the registration certificate you have just another animal.

THE PUREBRED – THE FOUNDATION OF IMPROVEMENT

The National Society of Livestock Record Associations was organized in 1911. It is an organization of livestock registry associations, all non-profit organizations having common standards, common interests and believe in the purebred philosophy as a means of livestock improvement.

The Society has 54 member associations. The data shown in this directory is for the 1979 fiscal year of these associations.

In 1979 these member associations recorded 2,634,050 animals. This is almost a 14% increase over the previous year. All species showed an increase in recordings except Ponies. Swine led all species with a 28.7% increase. Sheep showed a 26.3% increase. Goats were up by 19.2%, Light Horses by 9.2%. Dairy Cattle by 6.4% and Beef Cattle by 4.1%.

Represented in this Society are 354,366 breeders making this Society the world's largest organization of people representing a common and dedicated cause–the more efficient production of food by using purebred livestock as the basic foundation for progress and improvement.

The Society provides an opportunity for qualifying livestock Registrys to cooperate and work together in solving problems of common interest; to develop programs and procedures on matters of common interest; to study and develop improved procedures for processing and preserving records and pedigrees; to develop testing, improvement and promotional ideas; to aid in the establishment of useful and workable health regulations and ecology programs; to develop effective, workable and protective regulations and procedures for artificial insemination and embryo transplants; to aid in the formulation of practical tax legislations; to aid in developing adequate facilities and workable procedures for blood typing; to help in the development of improved and more meaningful shows and fairs; to aid in the development of workable export and import procedures and regulations and in the development of programs for service and consultation to commercial livestock producers.

Single copies of this directory available on request. Make requests to: Harold Boucher, Secretary, 210 Utah, West Plains, MO 65755.

BEEF CATTLE

American Angus Association
3201 Frederick Blvd., St. Joseph, Mo. 64501
Dr. C. K. Allen, Exe. Vice President. Ph: 816-233-3101
Active Members 27,503 - Transfers 155,547
Registrations 266,693
1-Mo. 2-Ia. 3-Mt. 4-Ne. 5-SD
6-Tx. 7-Va. 8-Ks. 9-Il. 10-Ok.
Breed Publication: The Angus Journal
Frederick and Brookside, St. Joseph, Mo.

American Brahman Breeders Association
1313 La Concha Lane, Houston, Tx. 77054
Wendell Schronk, Secretary, Ph. 713-795-4444
Active Members 2,800 - Transfers 25,377
Registrations 32,278
1-Tx. 2-La. 3-Fl. 4-Ar. 5-Ms.
6.-Al. 7-Ok. 8-Ga. 9-NC 10-NM
Breed Publication: The Brahman Journal
Box 1031 Sealy, Tx. 77474

American Breed Association, Inc. (Assoc.)
306 South Ave. E., Portales, NM 88130
Mrs. Jewell Jones, Secretary, Ph. 505-356-8019
Active Members 130 - Transfers 82
Registrations 514
1-NM 2-Tx. 3-Ok. 4-La. 5-Ar.
6-Mo. 7-Ms. 8-Az. 9-Ca. 10-Ga.
Breed Publication: American Breed Newsletter

American Chianina Association (Assoc.)
Box 159, Blue Springs, Mo. 64015
Jack Barr, Secretary, Ph. 816-229-1944
Active Members 3,796 - Transfers 2,676
Registrations 5,073
1-Tx. 2-Mo. 3-Ky. 4-La. 5-Mt.
6-Ok. 7-Ne. 8-Oh. 9-Ca. 10-Tn.
Breed Publication: American Chianina Journal

American Hereford Association
715 Hereford Drive, Kansas City, Mo. 64101
H. H. Dickenson, Secretary, Ph. 816-842-3757
Active Members 20,000 - Transfers 96,525
Registrations 200,482
1-Tx. 2-Ne. 3-Mt. 4-SD 5-Ks.
6-Ok. 7-Co. 8-Id. 9-Wy. 10-ND
Breed Publication: American Hereford Journal

American International Charolais Association
1610 Old Spanish Trail, Houston, Tx. 77054
Donald E. Nelson, Exe. Vice Pres., Ph. 713-797-9211
Active Members 6,000 - Transfers 20,106
Registrations 29,036
1-Tx. 2-Fl. 3-Mo. 4-Ok. 5-Ks.
6-Ky. 7-Ar. 8-SD 9-Oh. 10-Ga.
Breed Publication: Charolais Journal

American Maine-Anjou Association
564 Livestock Exchange, Kansas City, Mo. 64102
Judy Taylor, Office Manager, Ph. 816-474-9555
Active Members 700 - Transfers 3,650
Registrations 8,862
1-Ia. 2-Tx. 3-Ok. 4-Mt. 5-Il.
6-Mi. 7-Oh. 8-Ks. 9-Mo. 10-Ky.
Breed Publication: Maine-Anjou Mark
Box 601, Albany, Tx. 76430

American Murray Grey Association
1222 N. 27th St., Room 216
Billings, Mt. 59107
Joan L. Turnquist, Exe. Sec., Ph. 406-248-1266
Active Members 300 - Transfers 400
Registrations 1,200
1-Mt. 2-Ia. 3-Mo. 4-Il. 5-Wy.
6-Ks. 7-Oh. 8-Tx 9-Va. 10-Or.
Breed Publication: Murray Grey News

American Polled Hereford Association
4700 E. 63rd St., Kansas City, Mo. 64130
Dr. T. D. 'Dusty' Rich, Pres., Ph. 816-333-7731
Active Members 42,363 - Transfers 111,186
Registrations 175,042
1-Mo. 2-Tx. 3-Ks. 4-Ok. 5-Tn.
6-Il. 7-Ky. 8-SD 9-Ga. 10-ND
Breed Publication: Polled Hereford World

American Red Poll Association
3275 Holdrege St., Lincoln, Ne. 68503
John G. Nemeth, Secretary, Ph. 402-466-2591
Active Members 363 - Transfers 1,494
Registrations 2,237
1-In. 2-Tx. 3-La. 4-Il. 5-Ar.
6-Tn. 7-Ne. 8-Oh. 9-Mn. 10-Al.
Breed Publication: Red Poll News

American Scotch Highland Breeders Association
Rt. 2, Box 403, Kalkaska, Mi. 49646
Gloria Allen, Secretary, Ph. 616-258-2329
Active Members 246 - Transfers 254
Registrations 447
1-Co. 2-Wa. 3-Oh. 4-Mn. 5-Ma.
6-Pa. 7-Ca. 8-NY 9-Vt. 10-NH
Breed Publication: The Bagpipe
Box 89, Knoxville, Tn. 37901

American Shorthorn Association
8288 Hascall St., Omaha, Ne. 68124
James W. Shirley, Secretary, Ph. 402-393-7200
Active Members 3400 - Transfers 10,772
Registrations 18,484
1-Il. 2-Ia. 3-Mo. 4-Ne. 5-Ks.
6-In. 7-Ca. 8-Tx. 9-ND 10-Mn.
Breed Publication: Shorthorn Country

American Simmental Association, Inc.
1 Simmental Way, Bozeman, Mt. 59715
Earl B. Peterson, Exe. Sec., Ph. 406-587-4531
Active Members 7,501 - Transfers 37,923
Registration 63,005
1-Tx. 2-Mt. 3-Ia. 4-Ks. 5-Ne.
6-SD 7-Mo. 8-Il. 9-ND 10-Ky.
Breed Publication: Simmental Shield
Box 511, Lindsborg, Ks. 67456

Beefmaster Breeders Universal
350 GPM South Tower, 800 N.W. Loop 410
San Antonio, Tx. 78216
Gene Kuyendall, Exe. Vice-Pres., Ph. 512-341-1277
Active Members 1,124 - Transfers 13,000
Registrations 25,000
1-Tx. 2-Fl. 3-Ok. 4-Ms. 5-Tn.
6-Az. 7-Ga. 8-Al. 9-La. 10-Mo.
Breed Publication: The Beefmaster Cowman
Box 29368, San Antonio, Tx. 78229

Devon Cattle Association, Inc.
Box 628, Uvalde, Tx. 78801
Dr. Stewart H. Fowler, Secretary, Ph. 512-278-2201
Active Members 348 - Transfers 842
Registrations 1,109
1-Ms. 2-Or. 3-Ca. 4-Tx. 5-Va.
6-Wa. 7-Ok. 8-La. 9-Wy. 10-Ma. & Mo.
Breed Publication: The "Ruby Red" News

International Brangus Breeders Association, Inc.
9500 Tioga Dr., San Antonio, Tx. 78230
Jerry Morrow, Sec., Ph. 512-696-8231
Active Members 1,200 - Transfers 15,216
Registrations 15,582
1-Tx. 2-Ok. 3-Ar. 4-Ga. 5-Az.
6-Mo. 7-NM 8-Ca.
Breed Publication: Brangus Journal

Red Angus Association of America
Box 776, Denton, Tx. 76201
Lyle Springer, Secretary, Ph. 817-387-3502
Active Members 1,581 - Transfers 8,680
Registrations 11,397
1-Mt. 2-SD 3-Wy. 4-Ia. 5-Tx.
6-Ne. 7-Co. 8-Ca. 9-Mo. 10-Ok.
Breed Publication: American Red Angus

Santa Gertrudis Breeders International
P.O. Box 1257, Kingsville, Tx. 78363
Dr. W. M. Warren, Exe. Manager, Ph. 512-592-9357
Active Members 2,319 - Transfers 16,809
Registrations 31,211
1-Tx. 2-Fl. 3-Ar. 4-Al. 5-Ok.
6-Ga. 7-Ms. 8-Mo. 9-Tn. 10-SC
Breed Publication: The Santa Gertrudis Journal
Box 2386, Ft. Worth, Tx. 76101

Texas Longhorn Breeders Association of America
705 E. Houston St. Suite 723
San Antonio, Tx. 78205
Karen Powell, Secretary, Ph. 512-225-3444
Active Members 808 - Transfers 4,147
Registrations 5,280
1-Tx. 2-Co. 3-Ok. 4-Ks. 5-Ne.
6-Wy. 7-Ca. 8-NM 9-Mt. 10-SD
Breed Publication: Texas Longhorn Journal
Box 311, Walsenburg, Co. 81089

DAIRY CATTLE

American Guernsey Cattle Club
70 Main St., Peterborough, NH 03458
Max L. Dawdy, Secretary, Ph. 603-924-3344
Active Members 1,629 - Transfers 12,660
Registrations 25,453
1-Wi. 2-Pa. 3-Oh. 4-In. 5-Mn.
6-NY 7-Ia. 8-Wa. 9-Mi. 10-Ca.
Breed Publication: Guernsey Breeders Journal

American Jersey Cattle Club
Box 27310, Columbus, Oh. 43227
J. F. Cavanaugh, Secretary, Ph. 614-861-3636
Active Members 1,772 - Transfers 23,364
Registrations 38,584
1-Oh. 2-Tx. 3-NY 4-Ca. 5-Vt.
6-Tn. 7-Pa. 8-Wi. 9-SC 10-Or.
This rank of states is 1978 data because 1979 data not yet available because of converting to new processing equipment.
Breed Publication: Jersey Journal

American Milking Shorthorn Society
1722-JJ S. Glenstone, Springfield, Mo. 65804
Harry Clampitt, Secretary, Ph. 417-887-6525
Active Members 854 - Transfers 2,371
Registrations 3,969
1-Mn. 2-Mo. 3-Ne. 4-Ok. 5-Ia.
6-Il. 7-Wi. 8-Ks. 9-Ca. 10-Oh.
Breed Publication: Journal of the Milking Shorthorn and Illawarra Breeds

Ayrshire Breeders Association
2 Union St., Brandon, Vt. 05733
J. D. Dodds, Secretary, Ph. 802-247-5774
Active Members 908 - Transfers 7,160
Registrations 10,008
1-NY 2-Mn. 3-Vt. 4-Oh. 5-Pa.
6-Ia. 7-Wi. 8-Ok. 9-Ma. 10-Il.
Breed Publication: The Ayrshire Digest

Brown Swiss Cattle Breeders Association of U.S.A.
Box 1038 (800 Pleasant St.) Beloit, Wi. 53511
Evans E. Wright, Secretary, Ph. 608-365-4474
Marvin L. Kruse, Exe. Vice-Pres., Market Development
Active Members 1,075 - Transfers 11,250
Registrations 14,487
1-Wi. 2-Ia. 3-Oh. 4-NY 5-Il.
6-Mn. 7-Tx. 8-Pa. 9-Az. 10-Ok.
Breed Publication: The Brown Swiss Bulletin

Dutch Belted Cattle Association of America, Inc.
Box 358, Venus, Fl. 33960
James H. Hendrie, Secretary, Ph. 813-465-4843
Active Members 40 - Transfers 27
Registrations 151
1-Fl. 2-Or. 3-In. 4-Il. 5-Tn.

Holstein-Friesian Association of America
1 South Main St., Box 808, Brattleboro, Vt. 05301
Robert H. Rumler, Executive Chairman
Zane V. Akins, Exec. Sec., Ph. 802-254-4551
Active Members 29,205 - Transfers 189,499
Registrations 330,691
1-Pa. 2-Wi. 3-NY 4-Oh. 5-Mn.
6-Ca. 7-Mi. 8-In. 9-Il. 10-Md.
Breed Publications: Holstein Assn. News
Box 808, Brattleboro, Vt. 05301
Holstein World, Sandy Creek, NY 13145

LIGHT HORSES

American Morgan Horse Association, Inc.
Oneida Co. Airport Industrial Park, Box 1
Westmoreland, NY 13490
Wayne Hipsley, Exe. Sec., Ph. 315-736-8306
Active Members 4,401 - Transfers 6,212
Registrations 4,268
1-Ca. 2-NY 3-Oh. 4-Mi. 5-Ma.
6-Pa. 7-Vt. 8-Wa. 9-Or. 10-Il.
Breed Publication: The Morgan Horse

American Quarter Horse Association
2736 W. 10th St., Amarillo, Tx. 79168
Ronald Blackwell, Secretary, Ph. 806-376-4811
Active Members 108,881 - Transfers 206,430
Registrations 121,575
1-Tx. 2-Ca. 3-Ok. 4-Co. 5-Ks.
6-Mt. 7-Ne. 8-Mo. 9-Ia. 10-NM
Breed Publication: The Quarter Horse Journal
3014 West Tenth, Amarillo, Tx. 79105

American Paint Horse Association
Box 18519, Fort Worth, Tx. 76118
Ed Roberts, Secretary, Ph. 817-439-3400
Active Members 9,143 - Transfers 6,890
Registrations 7,721
1-Tx. 2-Ok. 3-Ca. 4-Ks. 5-Co.
6-Oh. 7-Ne. 8-Mo. 9-Il. 10-Ia.
Breed Publication: Paint Horse Journal

American Saddle Horse Breeders Association
929 S. Fourth St., Louisville, Ky. 40203
James H. Blackwell, Secretary, Ph. 502-585-2425
Active Members 773 - Transfers 5,247
Registrations 3,931
1-Ca. 2-Ga. 3-Il. 4-In. 5-Ia.
6-Ky. 7-Mo. 8-NC 9-Oh. 10-Pa.
Breed Publication: American Saddle Horse Register

Appaloosa Horse Club, Inc.
Box 8403, Moscow, Id. 83843
Charles N. Nuber, Secretary, Ph. 208-882-5578
Active Members 15,000 - Transfers 21,250
Registrations 27,992
1-Ca. 2-Tx. 3-Ok. 4-Wa. 5-Mo.
6-Co. 7-Ks. 8-Or. 9-Mn. 10-Oh.
Breed Publication: Appaloosa News

Missouri Fox Trotting Horse Breed Association, Inc.
Box 637, Ava Mo. 65608
Lawrence Barnes, Secretary, Ph. 417-683-4419
Active Members 1,600 - Transfers 872
Registrations 2,300
1-Ca. 2-Mo. 3-Ar. 4-Tx. 5-Il.
6-Wy. 7-Ks. 8-Ia. 9-Ok. 10-Co.
Breed Publication: The Mo. Fox Trotter,
Box 191, West Plains, Mo. 65775
Annual Show & Celebration Book,
Box 637, Ava, Mo. 65608

The Arabian Horse Registry of America, Inc.
3435 S. Yosemite St., Denver, Co. 80231
Ralph F. Clark, Secretary, Ph. 303-750-5626
Active Members 12,000 - Transfers 25,700
Registrations 19,500
1-Ca. 2-Mn. 3-Wa. 4-Mi. 5-Tx.
6-Oh. 7-Wi. 8-Or. 9-Il. 10-Co.
Breed Publication: The Registry News

PONIES

American Shetland Pony Club
Box 435, Fowler, In. 47944
Peggy S. Smith, Secretary, Ph. 317-884-1242
Active Members 500 - Transfers 750
Registrations 1,000
1-Il. 2-Oh. 3-In. 4-Ia. 5-Mo.
6-Mi.
Breed Publication: The Pony Journal

Pony of the Americas Club, Inc.
1452 N. Federal Ave., Mason City, Ia. 50401
Garry Freeman, Secretary. Ph. 515-424-1586
Active Members 1,700 - Transfers 1,752
Registrations 1,110
1-Ia. 2-Ca. 3-Co. 4-Mn. 5-Mi.
6-Wi. 7-Wa. 8-Oh. 9-Tx. 10-Mo.
Breed Publication: POA Magazine

SHEEP

American Corriedale Association
Box 29C, Seneca, Il. 61360
Russell Jackson, Secretary, Ph. 815-357-6339
Registrations 6,072 - Transfers 3,287
1-Oh. 2-Il. 3-Ca. 4-Me. 5-Ia.
6-Mo. 7-SD 8-Mi. 9-In. 10-NY
Breed Publication: The Corriedale Extra

American Hampshire Sheep Association
Box 345, Ashland, Mo. 65010
Jim Cretcher, Secretary, Ph. 314-445-5802
Active Members 3,100 - Transfers 13,972
Registrations 20,962
1-Il. 2-Ca. 3-Or. 4-Mn. 5-Ok.
6-Oh. 7-Tx. 8-Ia. 9-In. 10-Co.

American Southdown Breeders Association
R.D. 4, Box 14B, Bellefonte, Pa. 16823
Florence W. Strouse, Secretary, Ph. 814-355-9841
Active Members 650 - Transfers 2,645
Registrations 3,951
I-Il. 2-Tx. 3-Ca. 4-Oh. 5-Ok.
6-Or. 7-Pa. 8-In. 9-Co. 10-Mn.

American Suffolk Sheep Society
55 East 100 North, Logan, Ut. 84321
Mrs. VeNeal Jenkins, Secretary, Ph. 801-753-2983
Active Members 2013 - Transfers 12,580
Registrations 25,580
1 Ca. 2-Or. 3-Co. 4-Ut. 5-Id.
6-Wy. 7-Wa. 8-Mt. 9-NM 10-Tx.
Ranking by states based on previous year's data.

Columbia Sheep Breeders Association of America
Box 272 Upper Sandusky, Oh. 43351
Richard L. Gerber, Secretary, Ph. 614-482-2608
Active Members 1,000 - Transfers 4,586
Registrations 8,020
1-Wy. 2-Co. 3-Mt. 4-ND 5-Oh.
6-Mn. 7-Ca. 8-Ut. 9-SD 10-Wi.
Breed Publication: Speaking of Columbias

Continental Dorset Club
Box 577, Hudson, Ia. 50644
Marion A. Meno, Secretary, Ph. 319-988-4122
Active Members 1,200 - Transfers 9,776
Registration 13,360
1-Oh. 2-Il. 3-Ca. 4-Ok. 5-Or.
6-Pa. 7-In. 8-NY 9-Ia. 10-Va.

National Suffolk Sheep Association
Box 324, Columbia, Mo. 65205
Mrs. Betty J. Biellier, Secretary, Ph. 314-442-4103
Active Members 7,000 - Transfers 30,676
Registrations 53,697
1-Ia. 2-Oh. 3-Ok. 4-Il. 5-Mn.
6-Tx. 7-Ne. 8-In. 9-SD 10-Ks.
Breed Publication: The Suffolk Banner
Box AA, Cuba, Il. 61427

Sheep Publications: Used by all breeds
Sheep Breeder and Sheepman
Box 796, Columbia, Mo. 65201
The Shepherd, Sheffield, Ma. 01257

GOATS

American Dairy Goat Association
Box 865, Spindale, NC 28160
Don Wilson, Secretary, Ph. 704-286-3801
Active Members 10,500 - Transfers 28,929
Registrations 41,500
Breed Publication: Dairy Goats

American Goat Society, Inc.
Rt. 2, Box 112, De Leon, Tx. 76444
Wayne Hamrick, Secretary, Ph. 817-893-6431
Active Members 1,529 - Transfers 3,180
Registrations 5,332
1-Tx. 2-Ca. 3-Mo. 4-Mi. 5-In.
6-Or. 7-Ok. 8-Wa. 9-Ar. 10-Ks.
Breed Publication: Voice of A.G.S.

Goat Publication: Used by all breeds
Dairy Goat Journal
Box 1908, Scotsdale, Az. 85252

SWINE

American Berkshire Association
601 W. Monroe, Springfield, Il. 62704
Merrill Smith, Secretary, Ph. 217-523-2123
Active Members 555 - Transfers 4,232
Registrations 15,012
1-Ia. 2-In. 3-Il. 4-Ok. 5-Mn.
6-Oh. 7-Wi. 8-Pa. 9-Ne. 10-Tx.
Breed Publication: Berkshire News

American Landrace Association, Inc.
Box 647, Lebanon, In. 46052
Steve Morrissey, Secretary, Ph. 317-482-3042
Active Members 720 - Transfers 6,175
Registrations 73,312
I-Ia. 2-Il. 3-Ga. 4-Mo. 5-In.
6-Mn. 7-Oh. 8-Al. 9-Pa. 10-NC
Breed Publication: The American Landrace

American Yorkshire Club, Inc.
Box 2417, West Lafayette, In. 47906
Glenn Conatser, Secretary, Ph. 317-463-3593
Active Members 3,318 - Transfers 64,665
Registrations 246,356
1-Ia. 2-In. 3-Il. 4-Mo. 5-Ga.
6-NC 7-Oh. 8-Ne. 9-Tn. 10-Ks.
Breed Publication: Yorkshire Journal

Chester White Swine Record Association
Box 228, Rochester, In. 46975
Daniel Parrish, Secretary, Ph. 219-223-3512
Active Members 1,051 - Transfers 10,862
Registrations 62,679
1-Il. 2-Ia. 3-Mo. 4-Tn. 5-Ok.
6-Mn. 7-Ks. 8-Tx. 9-Wi. 10-Oh.
Breed Publication: Chester White Journal

Hampshire Swine Registry
1111 Main St., Peoria, Il. 61606
Larry L. Rus, Secretary, Ph. 309-674-9134
Active Members 2,367 - Transfers 29,103
Registrations 143,716
I-Ia. 2-Il. 3-In. 4-Mo. 5-Ne.
6-Ok. 7-Oh. 8-Mn. 9-Tx. 10-Ga.
Breed Publication: American Hampshire Herdsman

National Hereford Hog Record Association
Rt. 1, Box 37, Flandreau, SD 57028
Ruby Schrecengost, Secretary, Ph. 605-997-2116
Active Members 200 - Transfers 598
Registrations 844
1-Tx. 2-SD 3-Ga. 4-Ia. 5-Pa.
6-Ky. 7-Il. 8-Mn. 9-WV 10-In.
Breed Publication: Advertiser

National Spotted Swine Record, Inc.
110 Main, Bainbridge, In. 46105
Bill Newham, Secretary, Ph. 317-522-6272
Active Members 1,500 - Transfers 24,480
Registrations 130,023
1-Ia. 2-Il. 3-In. 4-Mo. 5-Ok.
6.Mn. 7-Ga. 8-Ne. 9-Oh. 10-Ks.
Breed Publication: Spotted News
Greencastle, In. 46135

Poland China Record Association
Box B, 368 W. Douglas, Knoxville, Il. 61448
Don Nikodim, Secretary, Ph. 309-289-6786
Active Members 409 - Transfers 2,769
Registrations 18,905
1-Il. 2-Ia. 3-In. 4-Ok. 5-Mn.
6-Wi. 7-Mo. 8-Oh. 9-Ne. 10-Tn.
Breed Publication: The Poland China World

Tamworth Swine Association
414 Van Deman St., Washington, CH, Oh. 43160
Robert Highfield, Secretary, Ph. 614-335-5767
Active Members 175
Registrations 812
1-Oh. 2-Il. 3-In. 4-Va. 5-WV
6-Mo. 7-Pa. 8-Ky. 9-Tn. 10-NC
Breed Publication: The Tamworth News

United Duroc Swine Registry
1803 W. Detweiller Dr., Peoria Il. 61615
Bruce Henderson, Secretary, Ph. 309-691-8094
Active Members 4,116 - Transfers 51,242
Registrations 258,245
1-Ia. 2-Il. 3-In. 4-Mo. 5-Ne.
6-Tx. 7-Ok. 8-Mn. 9-Ga. 10-Oh.
Breed Publication: Duroc News

HONORARY MEMBERS

Mr. Carl Romer, 7900 East 66th St.
Kansas City, Mo. 64133

A goat breeder and long time representative to this Society from the American Goat Society as well as a faithful believer in the purebred idea of livestock improvement.

Mr. Paul Swaffer, The PX Outfit
Route 2, McLouth, Ks. 66054

A past president of the NSLRA for more years than any other one person; a past executive secretary of the American Hereford Association and a long time friend, booster and supporter of the purebred philosophy of livestock improvement.

INFORMATION SHEET

THE LIVESTOCK INDUSTRY IN ILLINOIS*

A. Number of Head in Illinois (thousands)	1946	1956	1966	1976
1. All Cattle	3176	3989	3732	3200
2. Hogs	6337	6348	6275	6500
3. Sheep	472	523	359	195
4. Chickens	25761	17582	10142	7800

B. Value of Head in Illinois ($Million)	1946	1956	1966	1976
1. All Cattle	$276.3	$382.9	$518.1	$528.0
2. Hogs	160.9	118.7	283.6	299.0
3. Sheep	5.2	7.1	6.1	5.3
4. Chickens	30.1	19.3	10.6	11.7

*Source: Illinois Agricultural Statistics, 1946-1976
Illinois Cooperative Reporting Service
Springfield, Illinois

STUDENT WORKSHEET 1

UNDERSTANDING THE LIVESTOCK INDUSTRY

PART I

Answer the following questions concerning the livestock enterprises.

A. The Swine Enterprise

1. Hogs have consistently yielded about __________ percent of the farm income per year in Illinois.

2. The average cash receipts from hogs in 1970-72 was around ___________ million dollars.

3. List nine characteristics of hogs which make them popular in Illinois.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

   g. ______________________________

   h. ______________________________

   i. ______________________________

4. The three leading countries in swine production are ____________________,

   ____________________,and ____________________.

5. The largest hog producing state in the United States is ____________________.

6. The two counties in Illinois which are the biggest producers of hogs are ______________

   and ____________________.

7. The five counties which have increased their hog production over 400 percent since 1960

   are ____________________, ____________________, ____________________,

   ____________________and ____________________.

8. The five resources necessary for swine production are:

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

9. When planning a swine enterprise, what questions should you consider before investing?

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

10. What is the formula for the hog corn ratio and what does it mean?

11. Calculate today's hog-corn ratio and explain your result.

B. The Sheep Enterprise

1. In 1972 there were ______________________ head of sheep on the Illinois farms.

2. The income received by farmers from sheep and wool in Illinois in 1973 was _____ million dollars.

3. Identify five characteristics of the sheep enterprise which make them popular.

   a. ____

   b. ____

   c ____

   d. ____

   e. ____

4. Identify two characteristics which are not favorable to sheep production.

   a. ____

   b. ____

5. The number of head of sheep in your local county in 1974 was __________.

6. The country which leads the world in both sheep and wool production is ______________

   and ________________ ranks second and the United States ranks ________________.

7. The major sheep production region of the U.S. is the ____________________________.

8. The six corn-belt states produce about ________ per cent of the nation's sheep.

9. Identify seven factors to consider to get maximum returns from your sheep enterprise.

   a. ____

   b. ____

   c. ____

   d. ____

   e. ____

   f. ____

   g. ____

C The Beef Breeding Enterprise

1. Why is beef such a popular enterprise?

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

2. The average consumption of meat consumption per person in the U.S. is about:

   ____________ beef and veal, ____________ lbs. pork, ____________ lamb and mutto

3. Identify six characteristics of the beef breeding enterprises.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

4. The three leading countries in beef production are ____________________,

   ____________________ and ____________________.

5. The leading state in cow-calf production is ____________________.

6. What factors have influenced beef production in the United States?

   a. ______________________________

   b. ______________________________

   c. ______________________________

7. Your county has ____________ head of beef cows.

8. Beef cows are most heavily concentrated in the ______________ portion of Illinois.

9. To determine if your farm is suited for beef production, what must be considered?

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f.

10. What three options are available in cow-calf operations?

a. ______________________________

b. ______________________________

c. ______________________________

11. What factors can affect gross returns of a beef cow enterprise?

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

12. What does the beef testing program consist of?

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

D. The Feeder Cattle Enterprise

1. The cost of cattle purchased for feeding is around ______________ percent of the amount received at time of sale for slaughter.

2. Name some characteristics of the feeder cattle enterprises.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

   g. ______________________________

3 The estimated feeder cattle supply outside feedlots in Illinois is ______________________.

4. Your local crop reporting district estimated _____________farms and_____________ head

   of grain fed cattle marketed in Illinois.

5. The ______________________ region of Illinois ranked first in farms and marketed grain fed cattle.

6. Each 100 lbs. of beef produced required_________ lbs. of concentrates and _________ lbs. of hay.

7. What factors should be considered for cattle feeding to be profitable?

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

PART II

1. Define the following livestock industry terms:

a. Barrow ______________________________

b. Boar ______________________________

c. Broiler ______________________________

d. Bull ______________________________

e. Cockerel ______________________________

f. Commodity ______________________________

g. Corn-Hog ratio ______________________________

h. Cows ______________________________

i. Diversified ______________________________

j. Ewe ______________________________

k. Fall lamb ______________________________

l. Feeders ______________________________

m Fryers ______________________________

n. Gilt ______________________________

o. Heifer ______________________________

p. Hen ______________________________

q. Production cycle ______________________________

r. Pullet ______________________________

s. Ram ______________________________

t. Sow ______________________________

u. Spring lamb ______________________________

v. Stag ______________________________

w. Steer ______________________________

x. Trends ______________________________

y. Wether ______________________________

z. Yearlings ______________________________

2. Why do we eat meat?

a. ______________________________

b. ______________________________

c. ______________________________

3. Outline the trends in the livestock industry in the following regions of the United States:

a. Midwest ______________________________

____

b. Plains ______________________________

____

c. Far west ______________________________

____

d. Southern ______________________________

____

e. Northeastern ______________________________

____

4. The average U. S. consumer spends approximately __________ % of their income per year for food.

5. Outline six basic trends in the cattle industry:

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

6. Outline five basic trends in the swine industry:

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

7. Outline four basic trends in the sheep industry:

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

8. Outline four basic trends in the poultry industry:

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

9. List seven manufactured and processed dairy products:

a. ____________________

b. ____________________

c. ____________________

d. ____________________

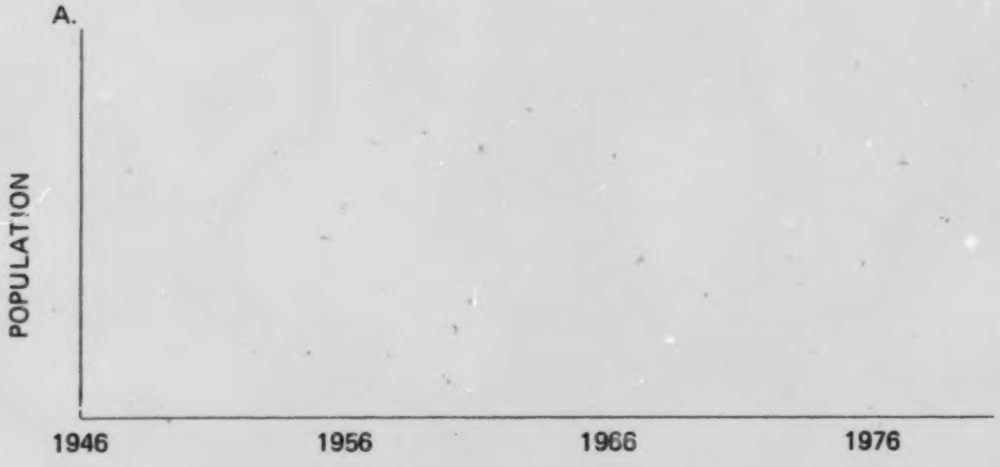
e. ____________________

f. ____________________

g. ____________________

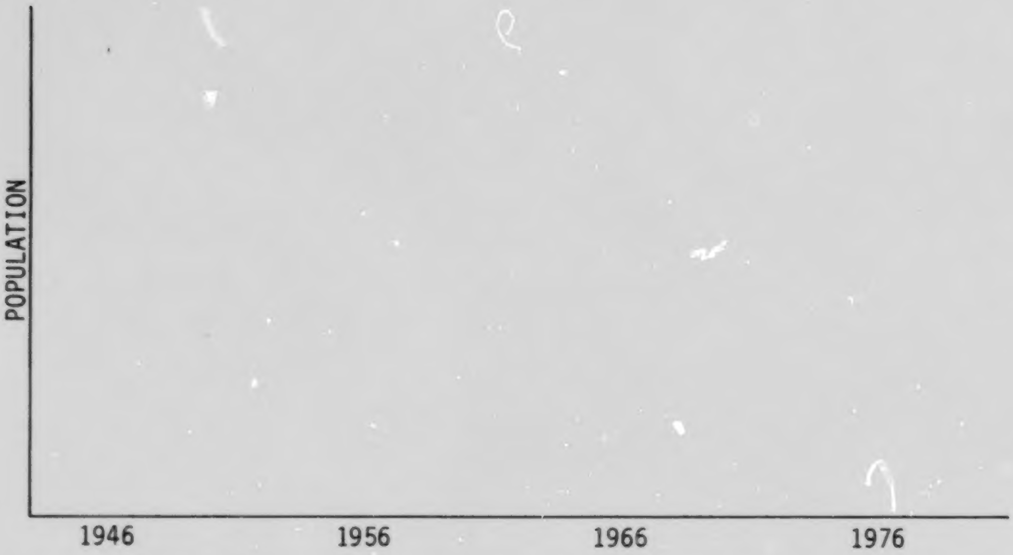
10. Chart a line graph showing trends (numbers) in Illinois or your county:

A.



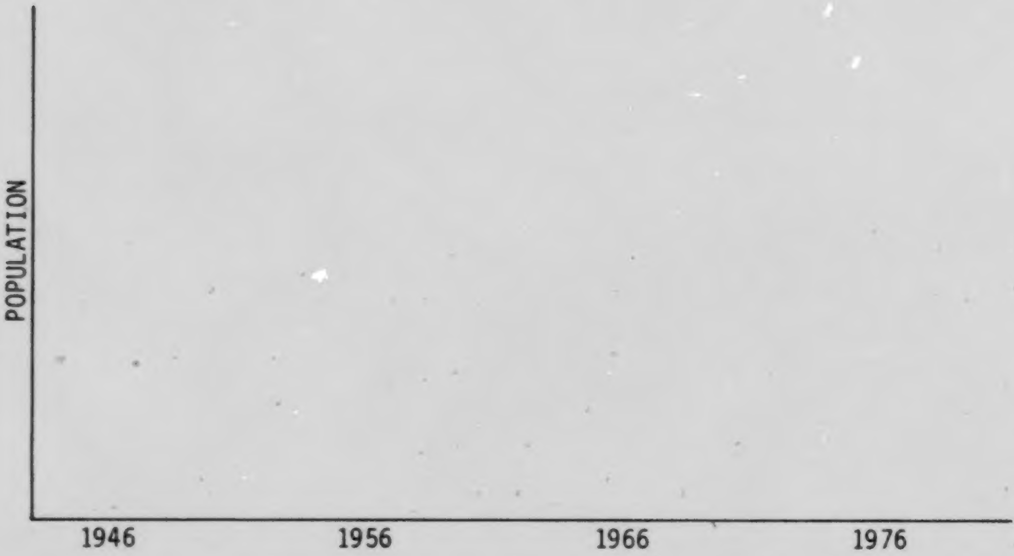
Trends in Illinois Beef Population
(State or County)

B.



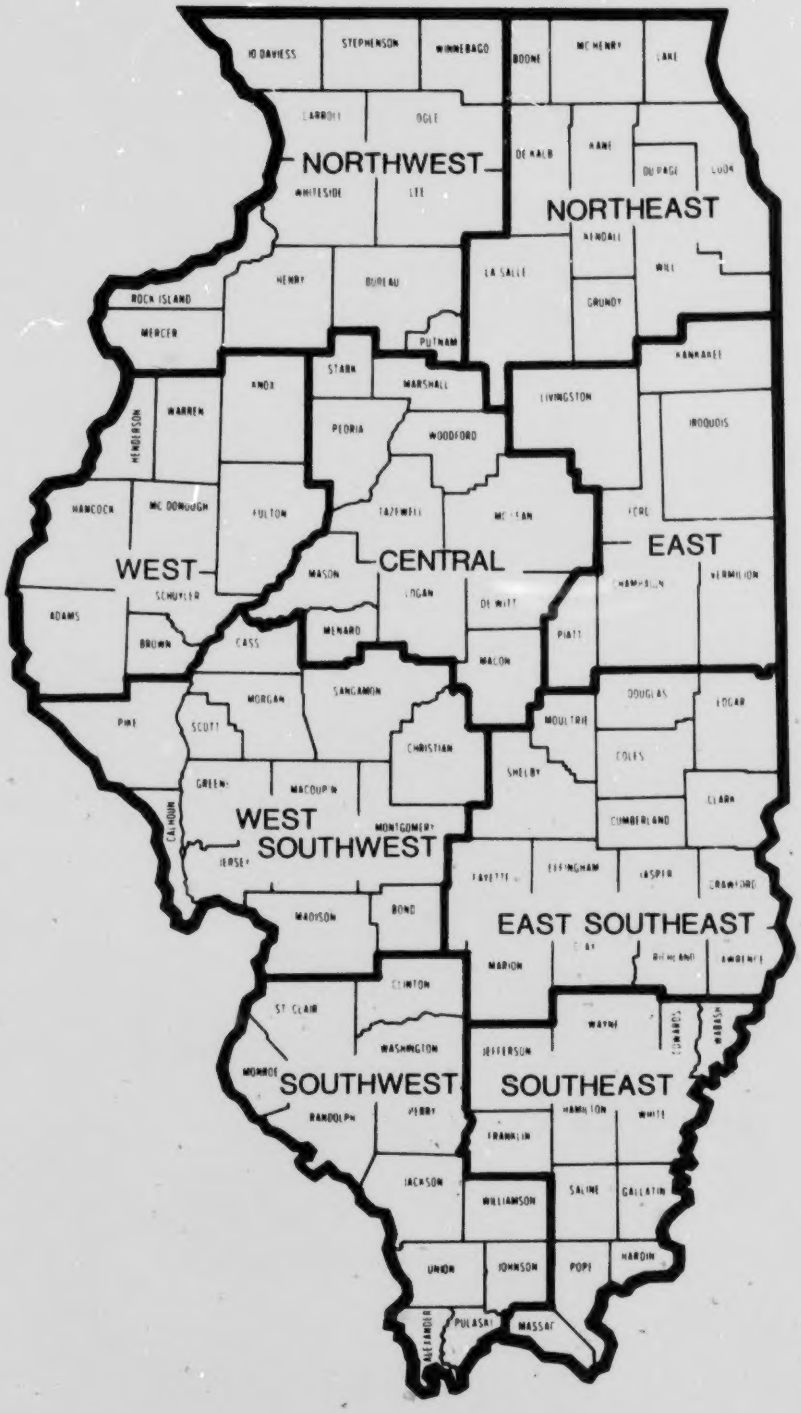
Trends in population of swine industry in Illinois or your county

C.



Trends in population of sheep, dairy, poultry, or other selected enterprises in Illinois or your county.

11. Locate on a map of Illinois, the major livestock enterprise areas (beef, swine, sheep, dairy). Shade in the general regions.



TEACHER'S KEY
STUDENT WORKSHEET 1

UNDERSTANDING THE LIVESTOCK INDUSTRY

PART I

Answer the following questions concerning the livestock enterprises.

A. The Swine Enterprise

1. Hogs have consistently yielded about 20 percent of the farm income per year in Illinois.

2. The average cash receipts from hogs in 1970-72 was around 604 million dollars.

3. List nine characteristics of hogs which make them popular in Illinois.

   a. produce rapid returns
   b. prolific
   c. provide use for farm grains
   d. efficient converters of feed grains
   e. prices are fairly uniform across weight and grades
   f. price cycles are short
   g. high dressing percentages
   h. can have small investment in building and equipment
   i. can keep labor costs low

4. The three leading countries in swine production are China, Brazil, and United States.

5. The largest hog producing state in the United States is Iowa.

6. The two counties in Illinois which are the biggest producers of hogs are Henry and Pike.

7. The five counties which have increased their hog production over 400 percent since 1960 are Effingham, Jasper, Wayne, Edwards and Randolph.

8. The five resources necessary for swine production are:

a. capital

b. land

c. labor

d. management

e. markets

9. When planning a swine enterprise, what questions should you consider before investing?

a. What kind and size of enterprise can you conduct with your resources available?

b. What additional resources can I acquire?

c. Can I get the needed capital?

d. Do I have the needed labor?

e. Do I have the management ability?

f. Do I like raising hogs?

g. Do I have the needed experience?

10. What is the formula for the hog corn ratio and what does it mean?

$$\frac{\text{Value of 100 lbs. of pork}}{\text{price of one bushel of corn}}$$

A high ratio means a profit to hog producers and

A low ratio means a loss to hog producers

11. Calculate today's hog-corn ratio and explain your result.

B. The Sheep Enterprise

1. In 1972 there were 252,000 head of sheep on the Illinois farms.

2. The income received by farmers from sheep and wool in Illinois in 1973 was 8 million dollars.

3. Identify five characteristics of the sheep enterprise which make them popular.

   a. two crops—lambs and wool
   b. initial costs are low
   c. low building costs
   d. better use of pasture
   e. use simple feed rations

4. Identify two characteristics which are not favorable to sheep production.

   a. wool price is influenced by politics
   b. animals are susceptible to parasites and predatory animals

5. The number of head of sheep in your local county in 1974 was ________.

6. The country which leads the world in both sheep and wool production is Australia and Russia ranks second and the United States ranks 12th.

7. The major sheep production region of the U.S. is the western range area.

8. The six corn-belt states produce about 13 per cent of the nation's sheep.

9. Identify seven factors to consider to get maximum returns from your sheep enterprise.

   a. all ewes should lamb
   b. multiple births
   c. low mortality
   d. optimum market weights and prices
   e. longevity
   f. maximum wool weights and prices
   g. high quality wool and mutton

C. The Beef Breeding Enterprise

1. Why is beef such a popular enterprise?

   a. status symbol

   b. superior food

   c. cross-breeding practices

   d. efficient use of materials that would otherwise go to waste

2. The average consumption of meat consumption per person in the U.S. is about:

   132 lbs. beef and veal, 57 lbs. pork, 2 lbs. lamb and mutton

3. Identify six characteristics of the beef breeding enterprises.

   a. use crop residue

   b. provide market for grain and hay

   c. low investment in building and equipment

   d. efficient labor use

   e. low death loss

   f. manure is valuable by-product

4. The three leading countries in beef production are United States, USSR and Brazil.

5. The leading state in cow-calf production is Texas.

6. What factors have influenced beef production in the United States?

   a. weather conditions

   b. number of cows and heifers

   c. prices paid and received

7. Your county has ______ head of beef cows.

8. Beef cows are most heavily concentrated in the western portion of Illinois.

9. To determine if your farm is suited for beef production, what must be considered?

a. how will they provide higher returns over other enterprises?

b. land

c. buildings and equipment

d. labor

e. capital

f. management

10. What three options are available in cow-calf operations?

a. beef cow, calf sold

b. beef cow, calf grown-out

c. beef cow, calf fed-out

11. What factors can affect gross returns of a beef cow enterprise?

a. calving percentages

b. weaning weights

c. quality of calves

d. price of calves

e. cow-calf replacement

f. price of replacement cows

12. What does the beef testing program consist of?

a. beef cow performance

b. post weaning performance of calves

c. carcass quality

d. herd size performance

D. The Feeder Cattle Enterprise

1. The cost of cattle purchased for feeding is around 50 - 75 percent of the amount received at time of sale for slaughter.

2. Name some characteristics of the feeder cattle enterprises.

   a. speculative

   b. glamour business

   c. use of roughages

   d. manure as a by-product

   e. use of labor

   f. death loss

   g. flexible program

3. The estimated feeder cattle supply outside feedlots in Illinois is 1381.

4. Your local crop reporting district estimated ______ farms and ______ head of grain fed cattle marketed in Illinois.

5. The northwest region of Illinois ranked first in farms and marketed grain fed cattle.

6. Each 100 lbs. of beef produced required 551 lbs. of concentrates and 63 lbs. of hay.

7. What factors should be considered for cattle feeding to be profitable?

   a. produce kind of beef consumer wants

   b. produce at low costs

   c. technological changes

   d. shifts in supply and demand

PART II

1. Define the following livestock industry terms:

   a. Barrow a male swine that has been castrated at an early age

   b. Boar a mature uncastrated male swine

   c. Broiler a young chicken 8 - 10 weeks of age-raised for meat

   d. Bull a male of the bovine species (cattle)

   e. Cockerel a male fowl less than one year of age

   f. Commodity a product of agriculture, i.e. beef, pork, soybeans, etc.

   g. Corn-Hog ratio value of bushels of corn required to equal value of 100 lbs. of pork Ratio of price of corn to price of pork.

   h. Cows a female bovine that shows evidence of having calved

   i. Diversified production of several different kinds of livestock

   j. Ewe a female sheep

   k. Fall lamb a lamb born in the spring and usually sold in the fall

   l. Feeders animals grown to a determined size or weight and to be placed in a feedlot and finished to a determined grade

   m Fryers a young immature bird, tender meated, smooth skin and flexible breastbone cartilage

   n. Gilt a young female swine that has not reproduced

   o. Heifer a young female bovine that has not reproduced

   p. Hen a mature female chicken

   q. Production cycle regular changes in price and production of agricultural commodities

   r. Pullet a female chicken less than one year of age

   s. Ram a mature male sheep

   t. Sow a mature female swine that has reproduced

   u. Spring lamb a lamb born in the fall and sold in the spring before July 1

   v. Stag a male animal castrated after reaching sexual maturity (except horses)

   w. Steer a male bovine castrated before reaching sexual maturity

   x. Trends directions of movement of a commodity in terms of production and prices

   y. Wether a castrated male lamb under one year of age

   z. Yearlings cattle between one and two years of age

2. Why do we eat meat?

a. taste

b. nutrition

c. available

3. Outline the trends in the livestock industry in the following regions of the United States:

a. Midwest Will continue strong because of grain supplies; cattle are declining some due to prices; swine are increasing; sheep steady to slight decrease.

b. Plains Overall some increase; cattle some reduction due to price and weather; swine are increasing; sheep - same as Midwest.

c. Far west Overall some slight reduction; cattle slight decrease; swine could increase in future if feed is available; sheep—very strong area.

d. Southern Overall strong area; cattle—strong, some decrease due to weather and prices; Swine—increasing, using milo as feed; sheep—steady, emphasizing wool production and feeders.

e. Northeastern Not much change; some decrease, too many people and not enough land and available feed to be a strong area.

4. The average U. S. consumer spends approximately 19 % of their income per year for food.

5. Outline six basic trends in the cattle industry: These are suggested ideas—other points can be emphasized.

a. More confinement operations; bigger and fewer.

b. Integration of two or more steps — packers and slaughters.

c. More cross breeding.

d. Some movement to pasture feeding to reduce cost.

e. Want about a 1000 lb. steer - choice grade.

f. Increasing use of yield grading.

6. Outline five basic trends in the swine industry:

a. Less fat - more muscling

b. Fast growing - marketed 150 - 175 days after farrowing.

c. Increase in cross breeding.

d. Confinement operations are increasing
Sale weight of 195 - 230 lbs.

7. Outline four basic trends in the sheep industry:

a. Decrease in eating of lamb - may turn around if beef prices increase.

b. Decrease in use of wool for clothing - should turn around as petroleum drives up cost of synthetics.

c. Striving toward a 200% lamb crop.

d. Better quality of lamb is being produced by selected breeding and research. Popularity should increase with some good public relations programs.

8. Outline four basic trends in the poultry industry:

a. Fewer and larger enterprises.

b. 240 eggs per hen per year.

c. 95% marketable eggs - 75% large or extra large Grade A

d. Feed conversion of 4½ lbs. of feed per one dozen of eggs.

9. List seven manufactured and processed dairy products:

a. market milk

b. skim milk

c. butter milk

d. dried milk

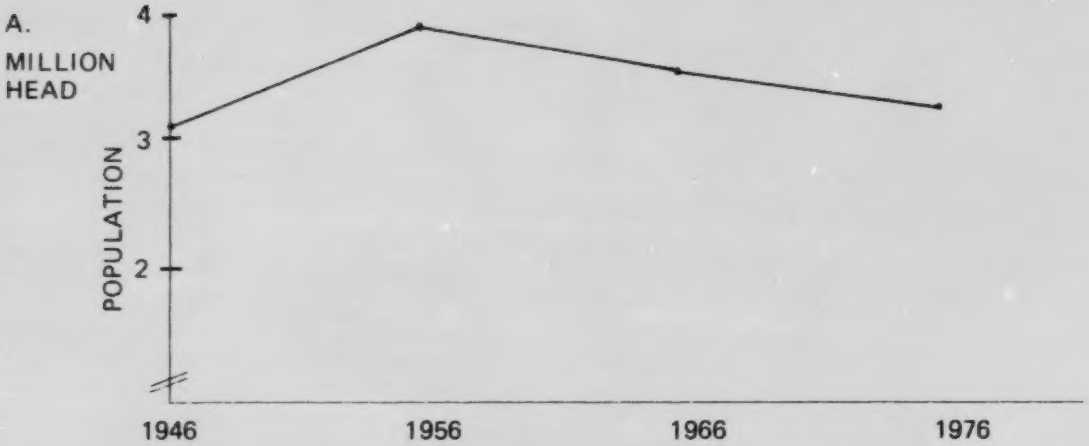
e. butter

f. cheese

g. ice cream

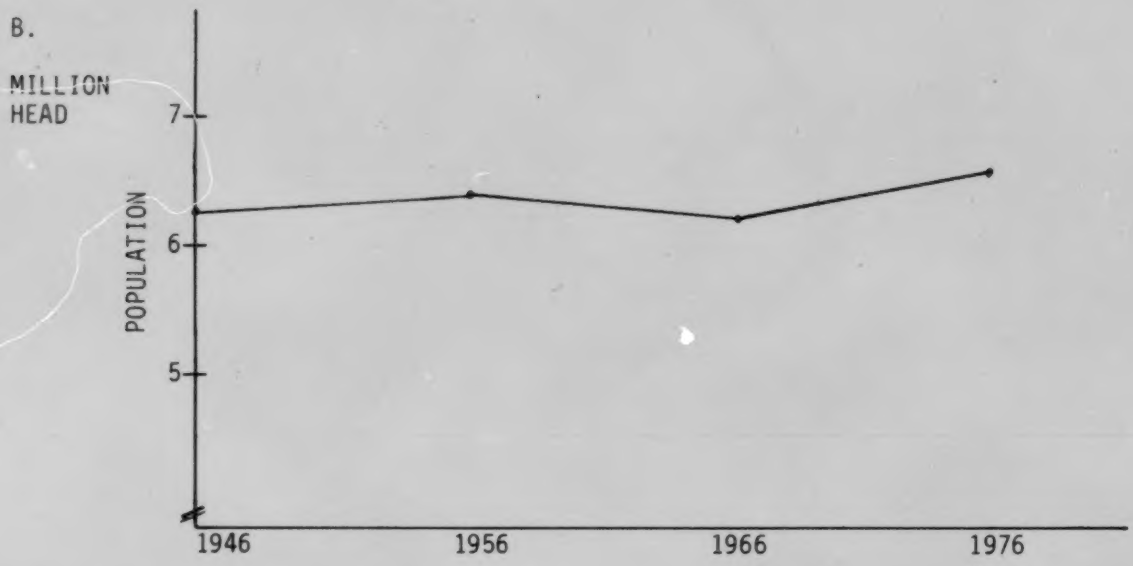
cottage cheese
processed or canned milk

10. Chart a line graph showing trends (numbers) in Illinois or your county:



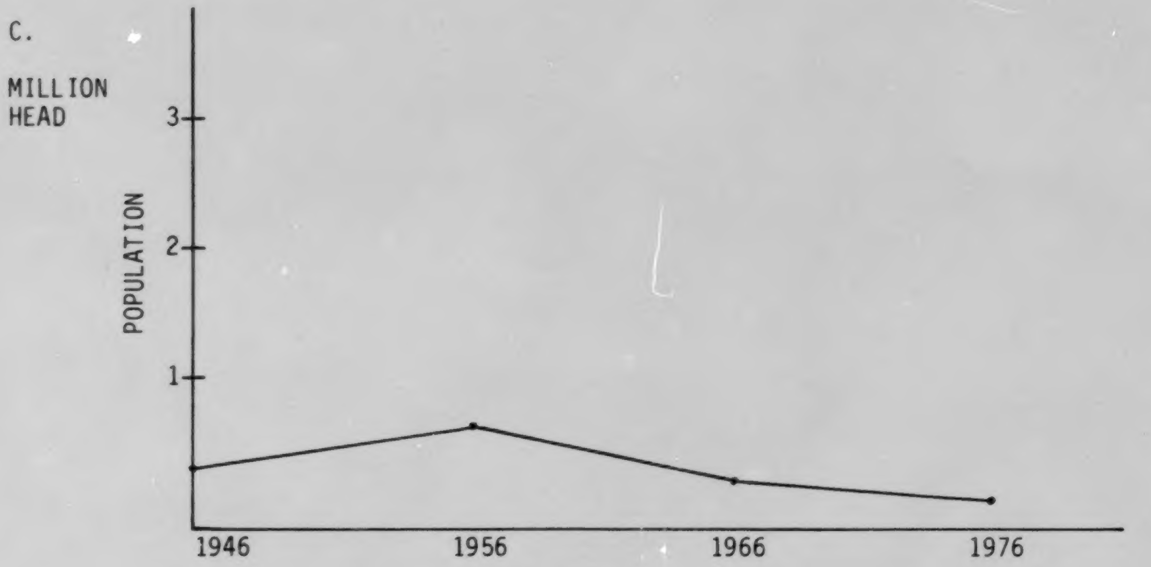
Trends in Illinois beef population
(State or County)

B.



Trends in population of swine industry in Illinois or your county

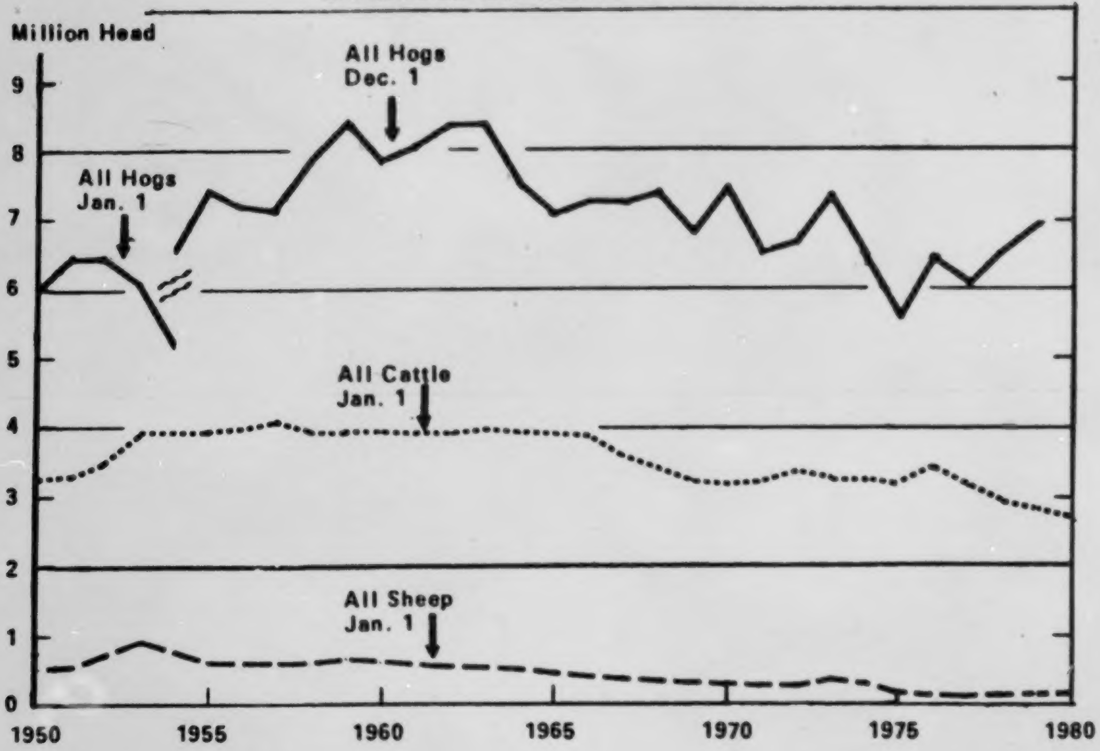
C.



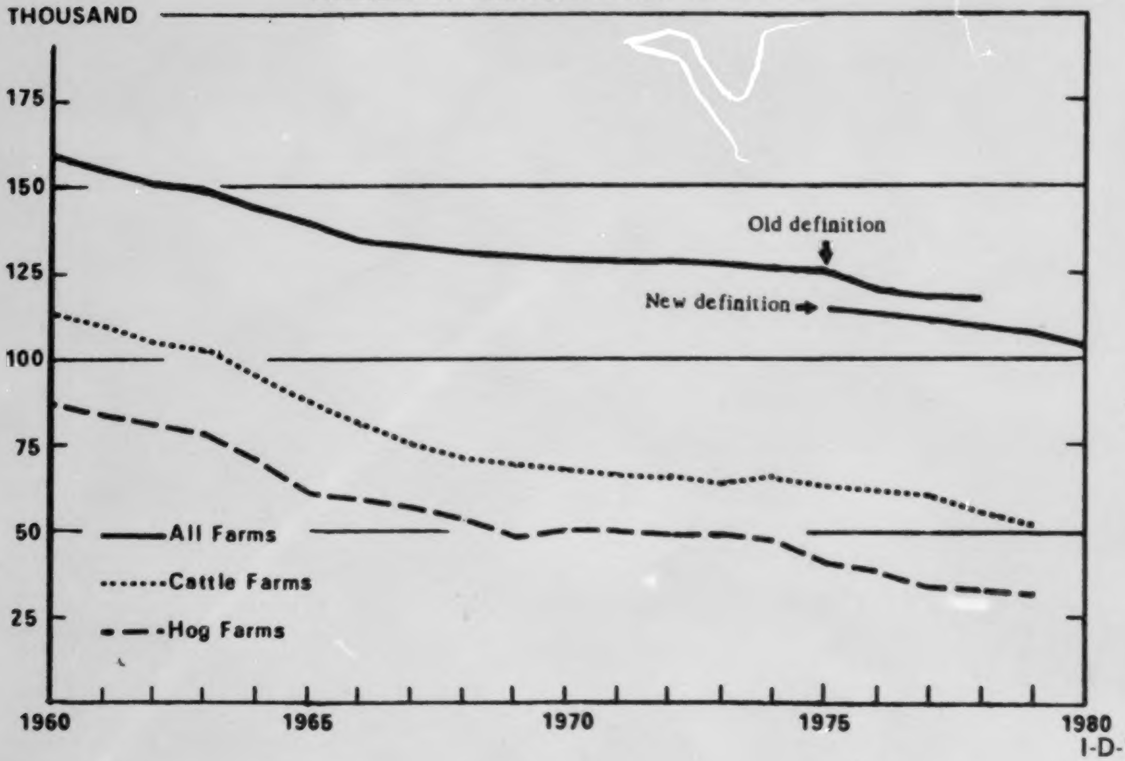
Trends in population of sheep, dairy, poultry, or other
selected enterprises in Illinois or your county.

TRENDS IN ILLINOIS LIVESTOCK PRODUCTION

LIVESTOCK ON ILLINOIS FARMS



TRENDS IN ILLINOIS FARM NUMBERS



I-D-1-37

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON THE SWINE ENTERPRISE

TRUE (+) - FALSE (O)

0 1. Grain returns are usually somewhat less per bushel when fed to hogs than when sold on the market.

0 2. As a country, United States ranks first in total swine production.

+ 3. A hog-corn ratio of 16 is usually considered necessary to make a clear profit in the hog business.

0 4. There is a considerable price variation received for most weights and grades of market hogs.

+ 5. When compared to sheep or cattle, hogs are more efficient converters of farm grains into meat.

+ 6. In Illinois, hogs rank first in livestock returns to the farmer.

0 7. Hogs are less prolific than sheep or cattle.

+ 8. Pigs can be marketed in about nine to ten months after the sow is bred.

+ 9. Labor cost of swine is high for farrowing enterprises and usually low for finishing enterprises.

+ 10. Arizona and New Mexico are being looked at by large hog producers as being ideal for raising hogs because they have ideal warm, dry climate.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

D 1. The county ranking first in hog production in Illinois is:

A. Pike
B. Adams
C. Bureau
D. Henry

C 2. When corn is $2.75 per bu. and hogs are $50.25 per hundred weight, the hog-corn ratio is:

A. 14
B. 16
C. 18
D. 20

B 3. Many hog producers are getting three litters per sow each ____ to ____ weeks by weaning pigs at three weeks of age.

A. 62 to 64
B. 56 to 58
C. 52 to 54
D. 48 to 50

A 4. Hogs consistently yield about _____ percent of Illinois farm income per year.

A. 20
B. 25
C. 30
D. 35

B 5. Five cornbelt states produce 56 percent of the hogs in the U.S. Those states are:

A. Illinois, Iowa, Indiana, Ohio, and Wisconsin
B. Iowa, Illinois, Indiana, Missouri, and Minnesota
C. Illinois, Iowa, Indiana, Ohio, and Missouri
D. Iowa, Illinois, Ohio, Minnesota, and Missouri

A 6. The entire hog production cycle is usually completed in _____ years.

A. Four
B. Five
C. Eight
D. Ten

C 7. Most of the hogs in Illinois are raised in the:

A. Southern counties
B. Eastern counties
C. Western part
D. Northern part

C 8. Hogs have approximately the following dressing percentage (weight of retail cuts as a % of live weight):

A. 45
B. 55
C. 65
D. 75

B 9. As a pork producing state, Illinois ranks _____ in the U.S.

A. 1st
B. 2nd
C. 3rd
D. 4th

A 10. Pigs can be marketed _____ to _____ days after farrowing.

A. 150 to 175
B. 180 to 190
C. 200 to 210
D. 220 to 245

MATCHING (Select the matching answer in the right column that most accurataly fits each item or description in the left column according to information presented in VAS Unit 1029a)

G 1. Capital
I 2. A leading country in swine production
M 3. An indicator of profit in producing hogs
D 4. A popular characteristic of swine
K 5. Can be very hard on small pigs
H 6. An unpopular characteristic of swine
B 7. An important individual characteristic necessary for a person to produce pork efficiently and profitably
J 8. Hog-corn ratio
F 9. Greatest labor requirement
L 10. Where a substantial amount of garbage is fed to hogs

A. Russia
B. Experience
C. Price of one bushel of corn divided by value of 100 lbs. of pork
D. Prolific
E. Southern states
F. Farrowing time
G. A resource necessary for swine production
H. Hard on fences
I. Brazil
J. Value of 100 lbs. of pork divided by price of one bushel of corn
K. Winter weather
L. New England states
M. Returns per $100 worth of feed fed

COMPLETION (Write the appropriate word or words to complete the statements.)

1. The state of Iowa ranks first in the U.S. in pork production.
2. In the entire world, hogs are raised extensively where corn is a major farming enterprise.
3. Considering all agricultural products produced in Illinois, hogs rank third in total returns.
4. Southern Illinois has experienced the largest percentage increase in hog production as compared to other areas of the state.
5. Feed costs are approximately 70 percent of the total cost of producing hogs.
6. Success in producing hogs as in any enterprise depends largely on the managerial ability of the operator.
7. Compared with most other classes of livestock, hogs have a rapid rate of turnover of capital invested.
8. An average size litter of pigs at weaning is seven to eight .
9. China is the leading country in swine production.
10. Like any other business, there is not a lot of room for operator inefficiency in swine production.

ESSAY QUESTIONS

1. Discuss one of the less popular characteristics of swine.

   (See pages 1 and 2 of VAS 1029a)

2. List and briefly discuss the resources necessary for swine production.

   (See pages 5-7 of VAS 1029a)

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON THE SHEEP ENTERPRISE

TRUE (+)–FALSE (0)

0 1. The sheep enterprise in Illinois is about the same size as the cattle enterprise.

+ 2. Russia ranks second in sheep production.

+ 3. In wool production, the United States ranks fifth.

+ 4. The labor requirement for sheep is generally low.

0 5. Sheep are quite resistant to parasites.

0 6. Sheep numbers are most heavily concentrated in the southern part of Illinois.

+ 7. Starting a sheep enterprise generally requires a small initial investment.

+ 8. The death losses for sheep are often high.

+ 9. Sheep generally need only simple home-grown rations.

+ 10. Most of the labor required for sheep is during lambing time.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

C 1. The leading state in number of sheep is:

A. Colorado
B. Illinois
C. Texas
D. Wyoming

A 2. The six corn-belt states produce about what percent of the nation's sheep?

A. 13
B. 27
C. 40
D. 63

D 3. The United States produces about how many lbs. of wool per animal?

A. 4.5
B. 5
C. 6.75
D. 9.0

B 4. It is estimated that not over ________ to ________ hours of labor are required per year for each ewe of the flock.

A. 1 to 2
B. 5 to 7
C. 12 to 14
D. 20 to 30

D 5. Many of the profitable farm flocks of Illinois are __________ to __________ ewes in size.

A. 10 to 20
B. 15 to 25
C. 20 to 35
D. 25 to 40

B 6. Wool prices are unpredictable because of:

A. labor unions
B. politics
C. quantity of wool
D. quality of wool

A 7. The number of sheep on Illinois farms in 1974 was __________ thousand.

A. 252
B. 330
C. 465
D. 582

B 8. The Western range states produce about __________ percent of sheep in the United States.

A. 51
B. 67
C. 83
D. 92

D 9. The county ranking first in sheep production in Illinois is:

A. Adams
B. Jefferson
C. Henry
D. LaSalle

B 10. During 1973, sheep made a cash return of ________ million dollars for lambs and wool to Illinois farmers.

A. 2
B. 8
C. 20
D. 64

MATCHING (Select the matching answer in the right column that most accurately fits each item or description in the left column according to information presented in VAS Unit 1031a)

F 1. A leading country in sheep
B 2. Lambing time
I 3. Range area
E 4. Two crops from sheep
L 5. Unpopular characteristic of sheep
A 6. Finnish Landrace Crossbred ewes
J 7. Corn-belt states
D 8. Coarser-wooled sheep
G 9. $84.00 per ewe
C 10. An important characteristic for efficient sheep production

A. 200 percent lamb crop
B. Greatest labor requirement
C. Good management
D. Southern states
E. Lambs and wool
F. Australia
G. Capital
H. 175 percent lamb crop
I. 12 western states
J. 13 percent of nation's sheep
K. Northeastern United States
L. Susceptible to diseases

COMPLETION (write the appropriate word or words to complete the statements)

1. The State of Texas ranks first in the United States in numbers of sheep.
2. Considering all agricultural products produced in Illinois, sheep and wool rank 8th in total returns.
3. Sheep make efficient use of roughage and corn or small grains which are produced in Illinois.
4. The price of wool has been unpredictable because of politics.
5. Many profitable farm flocks of Illinois are 25 to 40 ewes in size.
6. The only animals which can be sold off pasture at top price are lambs.
7. Essentially, returns are dependent on good management in all phases of the sheep enterprise.
8. In the corn-belt states, Illinois ranks 4th in number of sheep on farms.
9. Sheep production in the United States should be divided into the range and farm-flock production regions.
10. The southern states primarily use the Rambouillet-type of sheep.

ESSAY QUESTIONS

1. List and discuss the factors which are necessary to get the highest gross returns per ewe.

(see page 4 of VAS Unit 1031a)

2. List and briefly discuss the characteristics which tend to make sheep popular on many farms.

(see pages 1 and 2 of VAS Unit 1031a)

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON THE BEEF BREEDING ENTERPRISE

TRUE (+) - FALSE (0)

T 1. Beef cattle are one of the most efficient species of animals in their use of crop residues.

T 2. Ownership of beef cattle carries more prestige than any other major livestock enterprise.

F 3. Recent publicity on crossbreeding, exotic breeds, and other phases, have detracted from the attention usually given beef breeding.

F 4. The building and equipment investment in beef cattle is lower than for dairying but is usually higher than for the swine enterprise.

F 5. Cow manure is usually higher in nutrients than steer manure.

T 6. Beef cattle require less labor than dairy or swine.

T 7. The U.S. ranks first in production of beef and veal when compared to other nations.

T 8. The turnover of capital invested in beef cows is slow.

T 9. Recycling manure as a livestock feed is the most promising of the nonfertilizer uses.

F 10. It has been estimated that by 1985 the beef and veal demands will exceed 1 1/2 million metric tons.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

D 1. In the United States where we have 5.5% of the world's population, we consume the following percent of the world's beef and veal supply:

A. 10.8
B. 14.6
C. 18.2
D. 26.4

A 2. Some research studies indicate that the labor requirement per cow per year for a farm-sized beef herd is:

A. 6 to 8 hours
B. 10 to 12 hours
C. 14 to 16 hours
D. 18 to 20 hours

C 3. In the United States, beef cattle eat about ________ percent of the annual 6 billion bushel corn crop.

A. 15
B. 20
C. 25
D. 30

B 4. In the corn belt, farms producing corn, soybeans, and small grains have ________ tons of roughage for every ton of grain and soybeans harvested.

A. 1 1/2
B. 2
C. 2 1/2
D. 3

A 5. It is estimated that approximately ________ percentage of total nutrients in feeds are excreted in the manure by beef animals.

A. 80
B. 70
C. 60
D. 50

D 6. Area of the U.S. that has the largest number of beef brood cows: (U.S. Dept. of Agr. 1974)

A. Western
B. North Central
C. Southwest
D. West North Central

D 7. Among the leading cow-calf states Illinois ranks -

A. 4th
B. 7th
C. 10th
D. None of the above

C 8. The January 1, 1976 inventory shows that since 1950, Illinois beef cow numbers have -

A. More than tripled
B. Increased by 50%
C. More than doubled
D. Increased by 75%

C 9. In analyzing the costs and returns of three alternate options, the following made the greatest returns

A. Beef cow, calf sold at weaning.
B. Beef cow, calf grown out on pasture or roughages and then sold at approximately 700 to 800 lbs.
C. Beef cow, calf fed out and sold as market animal.

B 10. For beef cow performance testing, calf weights are adjusted to:

A. 180 days
B. 205 days
C. 230 days
D. 285 days

MATCHING (Select the answer that fits the situation best.)

J 1. Founder
H 2. A beef cow performance
F 3. A characteristic of the beef breeding enterprise
D 4. Limousin
K 5. Ranks second as a cow-calf state (1974)
C 6. A status symbol for many people
E 7. A valuable by-product of the beef cattle enterprise
B 8. Crop residue
G 9. A resource necessary for beef breeding production
L 10. 1000 lb. steer

A. Oklahoma
B. Corn stalks
C. The occupation of a beef cattleman
D. Exotic breed
E. Manure
F. Utilizes crop residues
G. Capital
H. Weaning weight of calf.
I. A steer that weighs 636 kilograms
J. A disease which may cause serious problems with beef cattle.
K Missouri
L A steer that weighs 454 kilograms.

COMPLETION (Write the appropriate word or words to complete the statements.)

1. A beef cow herd can provide both pleasure and profit on farms that are suited to handling cattle.

2. Beef cattle are among the least efficient animals for converting concentrate feeds into meat for humans.

3. Considering cattle numbers alone, India is the leader among the countries of the world.

4. When compared with sheep or hogs, beef cattle have an unusually low death rate.

5. Texas is the leading cow-calf state in the U.S.

6. Beef cows are found throughout Illinois, with heaviest concentrations in the western portion of the state.

7. If a person decides to become a beef breeder, a very important step after acquiring his cattle is performance testing.

8. Weighing calves to determine their weaning weight is one of the ways to evaluate beef cows performance.

9. If herd improvement is one of your major goals, you will need a sound breeding, management, and selection program based on accurate records.

10. Beef production in European countries is largely from dual - purpose cattle used both for milk and meat.

ESSAY QUESTIONS

1. List and briefly discuss the five resourses necessary for beef breeding production.

(See page 6 of VAS Unit 1056)

2. Describe each of the four parts of the Illinois beef production testing program.

(See page 8 of VAS Unit 1056)

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON THE FEEDER CATTLE ENTERPRISE

TRUE (+) – FALSE (0)

0 1. The expansion of the beef cattle feeding business in Illinois during the past 10 years has been more rapid than the rest of the nation.

+ 2. Consumer demand for beef has increased faster than the supply of beef.

0 3. The American people spend slightly more money for pork than they do for beef.

0 4. A larger feeder cattle supply comes from the western states than from the plains states.

0 5. The returns from feeding cattle for market are usually quite constant from year to year.

0 6. In Illinois, the beef cow herd has been the main beef-producing activity.

+ 7. Confinement housing of feeder cattle requires less space than feeding cattle on pasture.

+ 8. Yearling steers can make better use of corn stalks than calves.

+ 9. Cattle feeding is speculative.

+ 10. The feeder cattle operation on the cornbelt farm tends to balance the labor supply throughout the year.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

C 1. In the cornbelt the average man-hours of labor required to feed a single steer carried through the normal feeding program is:

A. 10 - 12
B. 4 - 5
C. 6 - 7
D. 2 - 3

D 2. Beef production has increased considerably in the past 20 years. Production needs to:

A. Decrease slightly to be equal to future demands
B. Remain about the same to be equal to future demands
C. Increase slightly to meet future demands
D. Increase considerably to meet future demands

A 3. The average return for $100 of feed fed to feeder cattle during the past 15 years (1962-1976) is:

A. $125
B. $115
C. $150
D. $90

B 4. The average pen space needed to feed cattle on an unpaved lot is:

A. 30-40 square feet
B. 125-200 square feet
C. 225-250 square feet
D. 75-100 square feet

A 5. A large number of cattle feeders in Illinois are apparently willing to feed cattle if:

A. Their return is sufficient to cover feed and cash costs but is short of paying for some of the fixed and farm overhead costs.
B. Their return is sufficient to cover feed, cash, fixed and overhead costs.
C. Their return is sufficient to cover feed, cash, and fixed costs but is short of paying for farm overhead costs.
D. None of the above.

D 6. The part of Illinois that markets the greater number of grain fed cattle is:

A. Northeast
B. West
C. Central
D. None of the above

C 7. The region of the United States that supplies the most feeder cattle for the feedlot is:

A. Western states
B. Cornbelt states
C. Plains states
D. Southeast states

D 8. The following nation or nations export beef and veal:

A. Argentina and Australia
B. Ireland and European Common Market
C. New Zealand
D. All of the above

A 9. Commercial feed lots require approximately the following number of hours of labor per steer to carry it through the normal feeding program:

A. 2 - 3
B. 9 - 10
C. 7 - 8
D. 4 - 5

D 10. Direct cash costs associated with cattle feeding are approximately the following per 500 lbs. of gain:

A. $1.50
B. $5.00
C. $20.00
D. $9.00

MATCHING (Match the correct phrase with the qualities listed.)

H 1. Manure
B 2. Speculative
L 3. Steak
D 4. Capital
J 5. Personal resources
E 6. The cattle industry
A 7. To be thought of as an investment not an expense
M 8. Location to feed cattle
C 9. Popular with young people
F 10. Space required for feeding in a wet climate

A. Buildings and equipment
B. Because cattle feeding has ups and downs, it is considered to be
C. Hamburger
D. A necessary resource for feeding cattle
E. Played a key role in the development of our civilization
F. 400 square feet per steer
G. 100 square feet per steer
H. A by-product of cattle feeding
I. A good source of labor
J. Experience and education
K. Direct costs
L. Prestige food
M. Well drained site
N. Fairly safe

COMPLETION (Write appropriate information or words to complete statements.)

1. The cost of cattle purchased for feeding is usually 50 to 75 percent of the amount received at the time of sale for slaughter.

2. Price changes are the major cause of income differences in cattle feeding.

3. Beef ranks first as America's favorite food.

4. The production of beef is world-wide with about one cow for every three people.

5. In locating a feeder cattle operation, pollution control is the first and most important consideration.

6. Before starting a cattle feeding operation, you should ask yourself if you have had enough education and experience in that enterprise.

7. Feeding steers on a paved lot requires 40 to 50 square feet per head.

8. In the state of Illinois the northwest area ranked number one in the marketing of grain fed cattle.

9. Manure is a by-product of the cattle feeding operation.

10. Steak and roast beef are the top prestige foods for adults; however, as a meat, hamburger is the universal favorite of teenagers.

ESSAY QUESTIONS

1. Why is the feeder cattle enterprise often considered to be a glamour business?

(See page 2 of VAS Unit 1057)

2. Compare the death losses of calves, pigs, and lambs.

(See page 2 of VAS Unit 1057)

UNIT D: LIVESTOCK SCIENCE

PROBLEM AREA: IDENTIFYING BREEDS OF LIVESTOCK AND POULTRY

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is during the fall semester. The estimated time for teaching this problem area is 7 to 10 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. That it is important for all agriculture students to be able to identify the breeds of livestock which are significant to their local community.
2. That students should understand and appreciate the distinguishing characteristics of the major breeds of livestock.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

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The teacher's guide and worksheets were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The suggested test questions were prepared by Vocational Agriculture Service, University of Illinois. Richard Schertz, Vocational Agriculture Instructor, Moweaqua, Illinois provided examples from which the worksheets were developed. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Livestock science

II. Problem area: Identifying breeds of livestock and poultry

III. Objectives: At the close of this problem area, the student will be able to:

1. Describe the major breeds of beef cattle including origin, characteristics and criticisms of the breeds.

2. Describe the major breeds of swine including origin, characteristics, and criticisms of the breeds.

3. Describe the major breeds of sheep including origin, characteristics, and criticisms of the breeds.

4. Describe the major breeds of dairy cattle including origin, characteristics, and criticisms of the breeds.

5. Describe the major classes and breeds of poultry including the history and characteristics of the common breeds.

IV. Suggested interest approaches:

1. Take the class on an S.O.E. Project tour to observe the various livestock breeds owned by the members of the class.

2. Promote class discussion by asking the following lead questions: "How many have livestock for their S.O.E. project?" "Why did you select your particular breed over the other breeds?" "What are some of the major differences between the breeds of beef cattle?" "Between breeds of swine?" "Breeds of sheep?" "Why does one breed of livestock become more popular than the other established breeds?" "How many belong to a breed association?" "Why did you join and what do you do in the association?"

3. Invite a breed association member or officer to class or visit his or her farm so he/she can discuss the purposes, goals and qualifications for membership into their association.

4. Show a film on the development of a breed of livestock. These are available from the various breed associations.

V. Anticipated problems and concerns of students:

A. Beef Cattle

1. What are the major breeds of beef cattle?

2. What are the characteristics of the major breeds of beef cattle?

3. What does an "exotic" breed refer to? Hybrid?

4. Where and when did the major breeds of beef cattle originate?

5. What are the strong points and weak points of each breed of cattle?

6. Why does one cross-breed cattle and how do you select the breeds to cross?

7. What does "dual purpose" cattle refer to?

8. What is the most popular breed of cattle in the U.S.?

9. What should I consider when selecting a beef enterprise for my S.O.E. project? What type of beef animal do we want today?

B. Swine

1. What are the major breeds of swine? What are the four major differences between the breeds?

2. What are the characteristics of the major breeds of swine?

3. What do the terms "lard type," "bacon type," and "meat type," refer to in the swine enterprise?

4. Where and when did the major breeds of swine originate?

5. What are the strong points and weak points of each breed of swine?

6. Why do you cross-breed swine and what should you consider in selecting the breeds to cross?

7. What are some of the problems which can disqualify an animal in a breed association?

8. What is the most popular breed of swine in the U.S.?

9. What should I consider when selecting a swine enterprise for my S.O.E. project?

10. What type (characteristics) of animal are we looking for today in the swine industry?

C. Sheep

1. What are the major medium wool breeds of sheep?

2. What are the characteristics of the medium wool breeds collectively?

3. What are the characteristics of each breed classified as a medium wool type?

4. What are the major long wool breeds of sheep?

5. What are the characteristics of the long wool breeds collectively?

6. What are the characteristics of each breed classified as a long wool type?

7. What are the major fine wool breeds of sheep?

8. What are the characteristics of the fine wool breeds collectively?

9. What are the characteristics of each breed classified as a fine wool type?

10. Where and when did the major breeds of sheep originate?

11. What are some strong points and weak points of each breed of sheep?

12. What is the most popular breed of sheep in the U.S. today?

13. What should I consider when selecting a sheep enterprise for my S.O.E. project?

14. What type of animals do we want today in the sheep industry?

D. Dairy Cattle

1. What are the major breeds of dairy cattle?

2. What are the characteristics of the major breeds of dairy cattle?

3. What is the difference between a grade, a purebred and a registered dairy cow?

4. When and where did the major breeds of dairy cattle originate?

5. What are the purposes and goals of the Purebred Dairy Cattle Association?

6. What are the purposes and goals of the Dairy Herd Improvement Association (DHIA)?

7. What factors do I need to consider when selecting a dairy cow for my S.O.E. project?

8. What type of animal (characteristics) do we want today in the dairy cattle industry?

E. Poultry

1. What is the meaning of the following terms?

   a. class of chickens
   b. breed of chicken
   c. variety of chicken
   d. strain of chicken
   e. standard of perfection

2. What are the major classes and breeds of chickens (turkeys, ducks, geese, guineas)?

3. What are the characteristics of the major breeds of poultry?

4. What factors should I consider when selecting poultry for my S.O.E. project?

5. What type (characteristics) of poultry do we want today in the poultry industry?

VI. Suggested learning activities and experiences:

1. Distribute the appropriate VAS Unit (1024a, 1045a, 1046 or 1049) and have students record tentative answers to the problems and concerns listed by the students.

2. Hand out Student Worksheet 1 and show and discuss Slidefilm 102, Breeds of Beef Cattle.

3. Hand out Student Worksheet 2 and show and discuss Slidefilm 164A, Breeds of Swine.

4. Hand out Student Worksheet 3 and show and discuss Slidefilm 145, Breeds of Sheep.

5. Hand out Student Worksheet 4 and show and discuss Slidefilm 210, Breeds of Dairy Cattle.

6. Hand out Student Worksheet 5 on Breeds of Poultry and discuss the breeds and their characteristics.

7. Take a field trip to observe and identify the various breeds that are common within the community.

8. Develop a bulletin board using pictures and descriptions of the students' livestock projects.

VII. Application procedures:

1. This problem area will provide the student with a knowledge of the breeds of livestock and their characteristics.

2. The student will know the factors to consider when selecting a livestock enterprise for his/her S.O.E. project.

3. The student will know the type of animal the livestock industry is developing to meet the needs of today's market.

VIII. Evaluation:

1. Collect and grade Worksheets 1-5.

2. Grade any oral or written reports given on field trips or special readings.

3. Administer and grade a test on the breeds of livestock.

IX. References:

1. Vocational Agriculture Service, University of Illinois, Urbana

   VAS Unit 1024a, Breeds of Beef Cattle
   VAS Unit 1045a, Breeds of Swine
   VAS Unit 1046, Breeds of Dairy Cattle
   VAS Unit 1049, Breeds of Sheep
   Slidefilm 102, Breeds of Beef Cattle
   Slidefilm 164a, Breeds of Swine
   Slidefilm 210, Breeds of Dairy Cattle
   Slidefilm 145, Breeds of Sheep

2. Worksheets 1-5

3. Suggested Test Questions

STUDENT WORKSHEET #1

BREEDS OF BEEF CATTLE

BREED	ORIGIN (Place & Date)	Characteristics: A. Color B. Polled or Horned C. Temperament D. Production	Advantages and Disadvantages of Breed

I-D-2-7

WORKSHEET #1 (con't)

BREEDS OF BEEF CATTLE

Match the following:

_____ Hereford
_____ Angus
_____ Shorthorn
_____ Charolais
_____ Red Poll

A. Red, white, or roan
B. White
C. Black
D. Red
E. Red with white face, feet and switch

List 5 new breeds.

__________________ __________________
__________________ __________________
__________________ __________________

List 5 exotic breeds.

__________________ __________________
__________________ __________________
__________________ __________________

Define a new breed. ______________________________

____

Define an exotic breed. ______________________________

____

Match the following:

_____ Cow
_____ Bull
_____ Heifer
_____ Stag
_____ Calf
_____ Steer

A. Male animal used for breeding
B. Male animal castrated after reaching sexual maturity
C. Animal under 1 yr. of age
D. Female animal that has had a calf
E. Male animal castrated before reaching sexual maturity
F. Female animal that has not had a calf

STUDENT WORKSHEET #2

BREEDS OF SWINE

BREED	ORIGIN (Place & Date)	Characteristics: A. Face B. Set of Ears C. Color D. Size	Advantages and Disadvantages of Breed

WORKSHEET #2 (con't)

BREEDS OF SWINE

1. Match the following:

_____ Duroc
_____ Hampshire
_____ Spotted Poland China
_____ Chester White
_____ Poland China
_____ Yorkshire
_____ Tamworth
_____ Berkshire
_____ Landrace

A. White, with erect ears, origin England
B. Black, with white belts, front legs and feet
C. White, with drooping ears, origin U.S.
D. Red, with drooping ears
E. Black and White, spotted
F. Red, with erect ears
G. White, with drooping ears, long-bodied animals
H. Black, with white feet, face and tail, snub nose
I. Black, with occasional spots of white on legs, face

2. Circle the above breeds that originated in England.

3. Match the following:

_____ Crptorchidism
_____ Hernia
_____ Hermaphrocite
_____ Blind teat
_____ Inverted teat
_____ Pin nipple

1. A teat that gives no milk
2. When the testicles of the boar do not drop into the scrotum
3. A weakening of the muscles in the stomach which allows the internal organs to hang outside the animal
4. A nipple which is inside out
5. An animal that has characteristics of both male and female
6. A nipple that is so small there is danger of the pig injuring the nipple

4. Match the following:

_____ Boar
_____ Gilt
_____ Sow
_____ Barrow
_____ Stag
_____ Feeder pig
_____ Market hog

1. Male animal used for breeding
2. 30 to 60 lbs. pig
3. A pig that is being fed to go to market
4. A female that has had one litter of pigs
5. A female that has not had a litter of pigs
6. A male animal castrated before reaching sexual maturity
7. A male animal castrated after reaching sexual maturity

STUDENT WORKSHEET #3

BREEDS OF SHEEP

BREED	ORIGIN (Place & Date)	Characteristics: A. Wool B. Polled or Horned C. Size D. Color E. Production	Advantages and Disadvantages of Breed

WORKSHEET #3 (con't)

BREEDS OF SHEEP

1. Match the following:

_____ Corriedale
_____ Columbia
_____ Cheviot
_____ Dorset
_____ Hampshire
_____ Rambouillet
_____ Southdown
_____ Suffolk

A. Hornless, blackface and long. Muzzle moderately fine. Ears medium to long and black.

B. Head is strong, bold and ears carried well down on the side of the head, black or dark brown face and legs.

C. Head is small, hornless, dark nose, topknot of wool and clean face are desirable, white face and legs.

D. Alert, compact in appearance. Face slightly arched in ewes, nose black, white face and legs.

E. Medium size ears, wide apart, with color to match face and legs. Forelegs covered with wool down to the knees. Head broad and short. Hornless. Face color of a uniform gray or mouse-brown, and well covered with wool.

F. Face free from wool around and under eyes. Rams are horned and ewes are polled. Nostrils large.

G. Both sexes are hornless and open-faced. Hair on face should be white. Ears moderately long and free from wool. Hooves either white or black.

H. Head is neat, face white, nostrils large. Crown and jaws well covered with wool. Both sexes are horned. Ears medium size. Fleece extends well down on legs.

2. Circle the above breeds that originated in England.

3. Name two breeds known for their high quality wool.

a.

b.

4. What qualities or factors should you consider when selecting a breed of sheep for your SOE project?

5. Match the following terms:

_____ Ewe

_____ Fall lamb

_____ Ram

_____ Spring lamb

_____ Wether

A. Female sheep
B. A mature male sheep
C. A lamb born in fall and sold in spring
D. A lamb born in spring and sold in fall
E. Castrated male lamb under one year of age

STUDENT WORKSHEET #4

BREEDS OF DAIRY CATTLE

BREED	ORIGIN (Place & Date)	Characteristics: C. Size A. Color D. Temperament B. Polled or Horned E. Production	Advantages and Disadvantages of Breed

WORKSHEET #4 (con't)

BREEDS OF DAIRY CATTLE

1. Match the following:

_____ Holstein
_____ Ayrshire
_____ Guernsey
_____ Jersey
_____ Brown Swiss
_____ Milking Shorthorn

A. Light to deep cherry red, with white markings
B. Fawn varying from light to dark, may have black face and switch
C. Solid brown, light to dark
D. Red, red and white, white, or roan color
E. Black and white
F. A shade of fawn with white markings clearly defined

2. Define the following:

a. Bull ______________________________

b. Cow ______________________________

c. Heifer ______________________________

d. Stag ______________________________

e. 2% Milk ______________________________

f. Whole Milk ______________________________

3. Circle the two minor breeds and underline the two dual purpose dairy breeds.

Holstein
Red Danish
Dutch Belted
Red Poll

Devon
Jersey
Brown Swiss
Palomino

4. Why are dairy breeds so much larger than beef breeds?

5. A cow normally has how many teats? ____________

6. Which dairy breed is usually the largest breed? ______________________

EXTRA CREDIT -- What is colostrum? ______________________________

STUDENT WORKSHEET #5

BREEDS OF POULTRY

BREED	ORIGIN Place & Date)	Characteristics: A. Comb Type B. Color of Shanks and Toes C. Skin Color D. Egg Color E. Egg Production F. Popularity of Breed	Advantages and Disadvantages of Breed

WORKSHEET #5 (con't)

BREEDS OF POULTRY

1. Match the following breeds:

_____ Large White
_____ Pekin
_____ White Chinese
_____ Rhode Island Red
_____ Rouen
_____ White Leghorn
_____ Dark Cornish
_____ Pilgrim
_____ Medium White
_____ Plymouth Rock

A. 4 breeds of Poultry
B. 2 breeds of Turkeys
C. 2 breeds of Ducks
D. 2 breeds of Geese

2. What is the plumage color of the: White Leghorn? ______________________
Rhode Island Red? ____________________

3. What is the egg color of the: White Leghorn? __________________________
Plymouth Rock? __________________________

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON BREEDS OF BEEF CATTLE

TRUE (+) — FALSE (0)

0 1. Angus are a black, horned breed of cattle.

+ 2. Angus cattle produce a high quality, well marbled carcass.

+ 3. Charolais are rugged, thick, muscular cattle which originated in France.

0 4. Warren Gammon was the Statesman from Kentucky who imported some of the first Herefords.

0 5. Red Poll cows are extremely poor mothers and the calves usually require creep feeding.

+ 6. Shorthorns were bred originally for both meat and milk - dual-purpose animals.

+ 7. Devon is the breed used by the original settlers in America in the 1600's.

+ 8. Beefmaster cattle are a cross of Brahman, Shorthorn, and Hereford.

0 9. Brangus cattle are gray and polled.

+ 10. Simmental is the exotic breed from Switzerland.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

B 1. The exotic breed not from France:

A. Maine Anjou
B. Chianiana
C. Blonded Aguitaine
D. Limousin

C 2. Angus cattle are from:

A. France
B. England
C. Scotland
D. Italy

B 3. Warren Gammon of Iowa developed:

A. Charbray
B. Polled Herefords
C. Brangus
D. Beefmaster

D 4. Shorthorn Cattle are not (color):

A. Roan
B. Red
C. White
D. Black

D 5. Charolais cattle are especially noted for all but:

A. Creamy
B. Rugged appearance
C. Thick and muscular body
D. High quality carcass

C 6. Herefords are especially noted for:

A. High quality carcass
B. Well marbled meat
C. Foraging ability
D. Milking ability

D 7. Red Polls are especially noted for:

A. High quality carcass
B. Well marbled meat
C. Foraging ability
D. Mothering ability

C 8. Santa Gertrudis were originated in:

A. England
B. Scotland
C. Texas
D. Florida

A 9. Red Angus cattle have to do with:

A. A recessive gene
B. A dominant gene
C. Hybrid vigor
D. Heterosis

D 10. Shorthorns are especially noted for:

A. Good temperament
B. Easy handling
C. Ruggedness
D. Both A and B

MATCHING (Match the correct phrases with the qualities listed.)

C 1. Galloway
F 2. Herefords
B 3. Charolais
H 4. Shorthorn
E 5. Brahman
D 6. Santa Gertrudis
I 7. Red Poll
G 8. Simmental
J 9. Chianiana
K 10. Charbray

A. Closely related to the Devons
B. First arrived in the U.S. from Mexico in 1936
C. Black
D. King Ranch
E. Hump
F. Henry Clay imported a few in 1817
G. Swiss exotic
H. Cruickshank selected intensely within the breed
I. Light red to very dark red
J. Exotic from Italy
K. Charolais-Brahman cross

COMPLETION (Write appropriate information or words to complete statements.)

1. Modern-day beef breeds began in the late 1700's in Europe, especially in the British Isles.

2. Santa Gertrudis cattle are made up of two breeds of cattle. One of which is Brahman, the other is Shorthorn.

3. The Galloway breed has black, long, soft, wavy hair and a thick, mossy undercoat. It was developed in southwest Scotland.

4. Scotch Highland cattle have long, coarse, thick hair and are very winter hardy and exceptionally good foragers.

5. Charolais cattle originated in France.

6. Polled Shorthorns and Polled Herefords were developed by the "single-standard" and the "double - standard" methods.

7. Angus cattle mature early and produce a high quality carcass.

8. Warren Gammon began collecting naturally polled Herefords in 1900 to start the Polled Hereford breed.

9. Herefords have white faces and red bodies.

10. Ninety-five percent or more of the heifer calves of the angus breed are polled.

ESSAY QUESTIONS

Relate how breed information in the United States during the 20th century has differed from earlier breed information that took place in the British Isles during 18th and 19th centuries.

(See page 1 of VAS Unit 1024a.)

Discuss the characteristics, qualities, and important facts of the Milking Shorthorn.

(See page 8 of VAS Unit 1024a.)

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON BREEDS OF SWINE

TRUE (+)–FALSE (0)

+ 1. The most striking characteristic of the Hampshire is the white belt that encircles its black body.

+ 2. The Tamworth is one of the oldest breeds of hogs.

0 3. Duroc Hogs are red with black spots.

+ 4. Mature boars in good condition usually weigh 600 to 900 pounds.

+ 5. American Landrace hogs are white in color.

+ 6. The ear set on Chester White hogs is "drooping."

0 7. The Berkshire hog is black with a white belt.

0 8. Hogs were originally classified as meat and bacon types for many years.

0 9. Yorkshires have drooping ears.

+ 10. All inbred lines of hogs were developed at state and federal experiment stations.

MULTIPLE CHOICE

B 1. The breed of swine not from England:

A. Berkshire
B. Chester White
C. Hampshire
D. Yorkshire

D 2. Tamworth hogs are from:

A. America
B. China
C. England
D. Ireland

A 3. The breed of swine with erect ears is:

A. Berkshire
B. Chester White
C. Duroc
D. Poland China

D 4. The breed of hogs that is white is

A. Berkshire
B. Hampshire
C. Tamworth
D. Yorkshire

C 5. A. C. Moore and D. M. Magie developed:

A. American Landrace
B. Duroc
C. Poland China
D. Palouse

C 6. The Yorkshire hogs are especially noted for all but:

A. Excellent underline
B. Fast growing
C. Heavy muscling
D. High prolificy

A 7. The Hampshire is especially noted for all but:

A. Drooping ears
B. Good mothering ability
C. Good muscle development
D. Straight face

B 8. The most desirable backfat thickness of a 210–230 pound hog is:

A. .8 inches
B. 1.1 inches
C. 1.4 inches
D. 1.7 inches

B 9. When selecting breeding stock, the important factors one should consider are all but:

A. Growth rate of pigs
B. Length of legs
C. Size of litter
D. Weight of litter

A 10. The spotted hogs are what color?

A. Black and white
B. Black and red
C. Red and white
D. Red and black

MATCHING:

D 1. American Landrace
A 2. Berkshire
F 3. Chester White
B 4. Duroc
G 5. Hampshire
I 6. Minnesota No. 1
J 7. Poland China
C 8. Spotted
E 9. Tamworth
H 10. Yorkshire

A. Black with six white points
B. Jersey breed
C. Gloucester old spots
D. 1/16 to 1/64 Poland China
E. The Irish Grazer
F. Delaware County, Penn.
G. "Thin-rind" Hog
H. Large white
I. Inbred line
J. A.C. Moore and D.M. Magie
K. Yorkshire and Poland China Crosses

COMPLETION

1. The American Landrace originated in Denmark.
2. Berkshires originated in England.
3. The "ear set" on the Chester White is drooping.
4. The "ear set" on the Yorkshire is erect.
5. The Tamworth originated in Ireland.
6. The spotted breed was known as Spotted Poland China until 1961.
7. The full name of the O.I.C. breed is Ohio Improved Chester.
8. The Hampshire breed originated in England.
9. The breed which is number 1 in purebred registration is Duroc.
10. Mating animals of different breeds is known as cross breeding.

ESSAY QUESTIONS:

1. What general type of animal are we looking for today in the swine industry?

   See Introduction, VAS Unit 1045a and Section 11,
   Market Hogs, VAS Unit 1045a.

2. Discuss the factors one should consider when selecting swine breeding stock.

   See Introduction, VAS Unit 1045a.

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON BREEDS OF SHEEP

TRUE (+)–FALSE (0)

__0__ 1. The Corriedale is a fine-wool breed.

__0__ 2. The Shropshire breed originated in Australia.

__0__ 3. The Dorset is a polled breed.

__+__ 4. Rambouillets originated in France.

__0__ 5. The Lincoln breed is the most popular breed of sheep in the U.S.

__+__ 6. The Suffolk breed is hornless with black faces.

__+__ 7. Merinos are fine-wool sheep.

__+__ 8. The fine-wool breeds have the highest quality wool.

__0__ 9. Cotswold sheep are small, second only to Cheviot.

__+__ 10. The Columbia breed originated in the U.S.

MULTIPLE CHOICE:

__C__ 1. The breed which is not a medium wool breed is:

A. Cheviot
B. Corriedale
C. Cotsworth
D. Hampshire

__B__ 2. Oxfords originated in:

A. Australia
B. England
C. France
D. United States

__C__ 3. E. H. Mattingly of St. Louis developed:

A. Columbia
B. Dorset
C. Montdale
D. Southdown

__D__ 4. The breed that does not have a white face is:

A. Corriedale
B. Columbia
C. Dorset
D. Suffolk

D 5. The breed that is credited with being one of the oldest breeds of sheep is:

A. Corriedale
B. Columbia
C. Shropshire
D. Southdown

D 6. The Suffolk sheep are especially noted for all but:

A. good grazers
B. good mothers and milkers
C. large size
D. large quantities of fleece

B 7. Oxfords are especially noted for:

A. horns
B. large size
C. poor milkers
D. white face

B 8. Cheviots originated in:

A. Australia
B. England
C. France
D. United States

A 9. The major difference between the three types of merinos is the presence or absence of:

A. folds of skin
B. horns
C. tails
D. wool on the face

D 10. The Targhee breed originated in:

A. Asia
B. Australia
C. England
D. United States

MATCHING:

H 1. Corriedale
E 2. Cotswold
B 3. Columbia
F 4. Dorset
I 5. Lincoln
A 6. Montdale
G 7. Oxford
C 8. Romedale
D 9. Southdale
J 10. Southdown

A. E. H. Mattingly of St. Louis
B. King Ranch of Wyoming
C. Cross of Romney and Rambouillet breeds
D. Cross of Southdown and Corriedale breeds
E. Wavy ringlets or curls in wool
F. Both horned and polled strains
G. Largest of medium wool breeds
H. Half-breed sheep
I. Mainly used for cross-breeding
J. Smallest of medium wool breeds
K. Originated in France

COMPLETION:

1. Corriedale was first imported into the United States in 1914 by the Bureau of Animal Industry.
2. The two most popular breeds of sheep in the U.S. today are Hampshires and Suffolks.
3. The merino breed originated in Spain.
4. Mr. Little crossed Lincoln rams with Merino ewes to produce the Corriedale breed.
5. The Sheep Experimental Station of Dubois, Idaho used a Lincoln—Rambouillet cross to develop the Columbia breed that was adapted to the intermountainous regions of the west.
6. The Cheviot, Southdown, and Shropshire are the smallest in size of the sheep breeds.
7. The Lincoln breed is one of the largest breeds and produces the heaviest and coarsest fleeces.
8. The medium—wool type breeds produce the best mutton.
9. The fine—wool type breeds produce the best high quality wool.
10. The long—wool type breeds are used primarily for cross-breeding.

ESSAY QUESTIONS:

1. Discuss the various factors by which the breeds of sheep may be classified.

   A. Mutton or wool
   B. White or black face
   C. Horned or polled
   D. Type of wool produced
   E. Area of origination

2. If you were selecting a sheep breed for your S.O.E. project what characteristics, qualities and other important facts would you consider?

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON BREEDS OF DAIRY CATTLE

TRUE (+) - FALSE (0)

+ 1. The Guernsey is noted for her golden milk.

0 2. The ideal weight for a mature Holstein bull in breeding condition is 1500 pounds.

0 3. The most rapid expansion of the Brown Swiss took place in the Southern States.

0 4. The Ayrshire breed originated in England.

+ 5. Jerseys are the earliest maturing cattle.

+ 6. Heaviest concentrations of the Holstein breed are in New York, Pennsylvania, California, and the Midwest.

+ 7. A strong heartgirth explains the Ayrshires hardiness and ruggedness.

0 8. DHIA stands for Dairy Health Improvement Association.

+ 9. In the U. S., Texas and Ohio normally lead the nation in registrations of Jerseys each year.

0 10. Holstein Calves at birth weigh from 50-70 pounds.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

B 1. ____________ are the second leading dairy breed in numbers, with some 1.4 million head in the U.S.

A. Milking Shorthorns
B. Guernseys
C. Jerseys
D. Holsteins

D 2. The Holstein originally came from ____________.

A. Denmark
B. Switzerland
C. Scotland
D. the Netherlands

A 3. The ____________ states are more densely populated with Jerseys.

A. Southern
B. Eastern
C. Northern
D. Western

D 4. A dual purpose breed is the ___________.

A. Jersey
B. Brown Swiss
C. Red Danish
D. Red Poll

C 5. The breed noted for its' greatest production records.

A. Guernsey
B. Brown Swiss
C. Holstein
D. Milking Shorthorn

A 6. ___________ is one of the youngest recognized cattle breeds.

A. Red Danish
B. Holstein
C. Jersey
D. Guernsey

C 7. ___________ were orginally known as "Durham Cattle".

A. Red Polls
B. Jerseys
C. Milking Shorthorns
D. Ayrshire

B 8. The ___________ contributed to the foundation of the Shorthorn breed in England.

A. Ayrshire
B. Holstein
C. Brown Swiss
D. Guernsey

D 9. The most recent production testing program adopted by the Brown Swiss breeder association is the

A. IPR
B. ROP
C. HIR
D. DHIR

A 10. ___________ herds are found in all 50 states of the nation.

A. Brown Swiss
B. Jersey
C. Milking Shorthorns
D. Guernsey

MATCHING (Select the answer that fits the situation best.)

_D_ 1. Ayrshire
_I_ 2. Jersey
_F_ 3. Brattleboro, Vermont
_A_ 4. Brown Swiss
_C_ 5. Columbus, Ohio
_G_ 6. Guernsey
_B_ 7. Brandon, Vermont
_E_ 8. Holstein
_H_ 9. Milking Shorthorn
_J_ 10. Peterborough, New Hampshire

A. solid brown varrying from light to dark
B. location of the Ayrshire Breeders association
C. location of the American Jersey cattle club
D. light to deep cherry red, mahogany or brown with white markings
E. black & white marking clearly defined
F. location of the Holstein - Friesian association of America
G. a shade of fawn with white markings clearly defined
H. red, white or roan in color
I. some shade of fawn with or without white markings; the muzzle is black
J. location of the American Guernsey cattle club

COMPLETION (Write the appropriate word or words to complete the statements.)

1. The _Jerseys_ are one of the oldest among the dairy cattle.

2. The Brown Swiss breed originated in _Switzerland_.

3. The _Jerseys_ are a breed especially tolerant of hot temperature.

4. The characteristics that generally distinguish the different breeds include shape of body and horns, color or combination of color and _size_.

5. The _Holstein_ association is the world's largest dairy cattle registry organization.

6. A minimum weight for a mature Brown Swiss cow should be about _1400_ pounds.

7. The _Purebred Dairy Cattle Association_ consists of three representives from each of the organizations that sponsor the Aryshire, Brown Swiss, Guernsey, Holstein, and Jersey breeds of dairy cattle in the U.S.

8. _DHIA_ sponsors a program through which dairymen may test their herds.

9. _Jerseys_ are good grazers and fit well into a pasture-livestock system of farming.

10. The _Ayrshire_ breed was developed from native stock through long-term selection for hardiness, good udders, and efficiency of production.

ESSAY QUESTIONS

1. What are the purposes and functions of a dairy cattle breed association?

(See page 12 of VAS Unit 1046.)

2. List the six leading dairy breeds in the U.S. in order of numbers in production.

Holstein Freisian - 10 million head
Jersey - 3 million head
Ayrshire - 1.5 million head
Guernsey - 1.4 million head
Brown Swiss - 0.7 million head
Milking Shorthorn 0.35 million head

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON BREEDS OF POULTRY

TRUE (+)–FALSE (0)

__+__ 1. The white Plymouth Rock has a single comb.

__0__ 2. The Leghorn lays brown eggs.

__+__ 3. The Cornish is the most popular of the English breeds.

__0__ 4. The American breeds are all rated high in egg production.

__0__ 5. The Rhode Island Red is the largest of the American breeds.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

__D__ 1. Which of the following is not a Mediterranean breed?

A. Ancona
B. Leghorn
C. Minorca
D. Wyandotte

__D__ 2. Which breed does not have a single comb?

A. Jersey White Giant
B. New Hampshire
C. White Plymouth Rock
D. Wyandotte

__B__ 3. Which breed is rated high in egg production?

A. Cornish
B. Leghorn
C. New Hampshire
D. White Plymouth Rock

__B__ 4. The breed with yellow shanks is:

A. Australorp
B. Leghorn
C. Minorca
D. Orpington

__D__ 5. The turkey breed that did not originate in the U.S. is:

A. Beltsville Small-Type
B. Bourbon Red
C. Broad-breasted Bronze
D. White Holland

MATCHING

B 1. Class of Chickens
D 2. Breed of Chickens
A 3. Variety of Chickens
E 4. Strain of Chicken
C 5. Standard of Perfection

A. Subdivision of Breed
B. Where breed variety was developed
C. Describe the breeds, varieties and classes of poultry
D. Applies to birds in a class
E. Name of breeder who developed strain
F. Subdivision of a strain of poultry

COMPLETION

1. Chickens were domesticated by man about 5,000 years ago and can be found in every country in the world today.

2. Geese were the first birds to be domesticated and was a sacred bird in Egypt.

3. Turkeys are one of the few species of poultry native to North America.

4. The wild mallard is the ancestor of all the domestic breeds of ducks.

5. Guineas originated in Africa, and are raised in limited quantities in the U.S. today.

ESSAY QUESTIONS

1. Discuss the major factors responsible for the standardbred chicken we have in the U.S. today.

   A. Cockfighting developed vigor and vitality.
   B. Standardbred chicks developed for edible qualities.
   C. Poultry fancier bred for type and beautiful feathers between 1870 and 1920.

2. Discuss the major areas or factors that you should consider in selecting a breed or strain of poultry for your S.O.E. project.

   A. Egg production.
   B. Mortality rate in cage or laying house.
   C. Body size and vigor.
   D. Egg size and quality.
   E. Feed conversion.

UNIT D: LIVESTOCK SCIENCE

PROBLEM AREA: SELECTING LIVESTOCK

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is just preceding a planned livestock selection contest. The estimated time for teaching this problem area is 5 to 10 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. That agriculture students need to develop the ability to critically evaluate and make decisions which are based on judgemental factors.
2. That by developing the ability to select agricultural products based on standards of quality, the students will become better product users.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

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TEACHER'S GUIDE

I. Unit: Livestock science

II. Problem area: Selecting livestock

III. Objectives: At the close of this problem area, the student will be able to:

1. Describe the major characteristics to consider when selecting livestock.
2. Identify the major parts of selected livestock.
3. Discuss the common uses of livestock and the characteristics important for each use.
4. Identify wholesale cuts of selected livestock.
5. Describe the characteristics of an ideal animal as discussed in class.

IV. Suggested interest approaches:

1. Take a field trip to a livestock farm and have owner discuss the characteristics he/she uses to determine which livestock to keep or buy.
2. Show a film from a breed association depicting ideal breed characteristics.
3. Use "buzz groups" to have the class develop a list of characteristics to consider when selecting livestock.
4. Show slides of present and past agriculture students projects illustrating the importance of selecting livestock for their S.O.E. project.

V. Anticipated problems and concerns of students:

1. What are the ideal characteristics to look for when selecting livestock?
2. What are the main uses of livestock?
3. What are the major parts of an animal?
4. What are the wholesale cuts of an animal?
5. What is the difference between selecting an animal for breeding and selecting for feeding and marketing?
6. How do you locate people who sell good quality livestock?
7. How do you judge livestock?
8. What are the advantages and disadvantages of purebred livestock?
9. What are the advantages and disadvantages of crossbred livestock?
10. What are the important terms you need to know when selecting livestock?

VI. Suggested learning activities and experiences:

1. Distribute pictures of livestock of different quality and have students select the ones they would buy. Have the students give reasons for their choices and write them on the chalkboard. Discuss their reasons and importance.

2. Distribute pictures or show slides of livestock for judging, show both market and breeding rings. Discuss the factors one should consider in each circumstance.

3. Distribute Student Job Sheet 1 and have students identify the parts of the live animals. Discuss the importance of knowing the parts of an animal when selecting animals for breeding or showing.

4. Distribute Student Job Sheet 2 and have students identify the wholesale parts of the animals. Discuss how judges consider these parts when placing rings of livestock.

5. Show slides or transparencies of "ideal animals" and discuss the important characteristics of each using different views. Distribute copies of VAS Unit 1019a to the students for their reference on how and what to evaluate when judging. Distribute VAS 1061, Using Livestock Production Records. Have students read Section VI, How Do I Use Production Records at a Livestock Judging Contest?

6. Using slides, pictures or live animals, have students judge and place rings of livestock for both market and breeding – use appropriate judging cards and judging booklets.

7. Distribute Student Worksheet 1 and show Slidefilm 100A, Selecting Beef Breeding Animals, for discussion. Have students select a beef breed for their S.O.E. project and give reasons to support their choice.

8. Have students identify problems and concerns on selecting and purchasing hogs. Hand out VAS Unit 1033b, and Student Worksheet 2, Selecting Hogs. Discuss and answer the questions.

9. Identify problems and concerns on selecting breeding sheep. Hand out Student Worksheet 3, Selecting Sheep, and show Slidefilm 143A, Selecting Breeding Sheep. Discuss and answer their questions.

10. Identify problems and concerns on Selecting Dairy Cattle. Hand out Student Worksheet 4, Selecting Dairy Cattle, and show Filmstrip 207A, Selecting Dairy Cattle. Discuss and answer their questions.

11. Take a field trip or invite a purebreeder to class to discuss the characteristics they consider when purchasing livestock.

VII. Application:

1. The students should use this information for identifying animals to purchase for their S.O.E. projects.

2. This problem area should prepare students for participating in judging contests.

VIII. Evaluation:

1. Collect and evaluate job sheets.

2. Collect and evaluate worksheets.

3. Assess the students' reasons for placing rings of animals.

4. Administer and evaluate a test on selecting livestock.

IX. References and aids: (Note: All references are available from Vocational Agriculture Service, University of Illinois.)

1. VAS Unit 1019a, Judging Livestock
2. VAS Unit 1033b, Selecting and Purchasing Hogs
3. VAS Unit 1061, Using Livestock Production Records
4. Slidefilm 100A, Selecting Beef Breeding Animals
5. Slidefilm 143A, Selecting Breeding Sheep
6. Slidefilm 207A, Selecting Dairy Cattle
7. Livestock Judging Booklets, Beef, Swine, Sheep, Dairy Cattle
8. Transparencies
9. Worksheets 1–4, and Job Sheets 1 and 2
10. Slidefilm 103–1.1, Angus Judging Classes I.
11. Slidefilm 103–1.2, Angus Judging Classes II.
12. Slidefilm 103–2.1, Hereford Judging Classes.
13. Slidefilm 211–2.1, Holstein Judging Classes
14. Slidefilm 211–1.2, Guernsey Judging Classes
15. Slidefilm 146–1.1, Hampshire Sheep Judging Classes I.
16. Slidefilm 146–1.2, Hampshire Sheep Judging Classes II.
17. Slidefilm 171–1.1, Duroc Swine Judging Classes.
18. Sample Test Questions.

STUDENT WORKSHEET 1

SELECTING BEEF BREEDING ANIMALS

1. List the two factors that selection of beef breeding animals should be based upon.

   a. ______________________________

   b. ______________________________

2. Define type of individuality of a beef breeding animal.

3. What is meant by "desirable breed characteristics?"

4. What factors are considered under "desirable physical characteristics?" (side, rear, front)

5. What can be determined by handling the animal?

6. What factors should be considered when "selecting on production?"

STUDENT WORKSHEET 2

SELECTING HOGS

1. Why is quality being stressed more today when buying and selling market hogs?

2. Why is the meat-type hog more desirable than the short, chuffy animals and the rangy animals?

3. The selection of breeding animal by "type" involves looking at various parts of the animal. Briefly discuss each heading giving the desirable type.

   a. General appearance –

   b. Conformation –

   c. Quality –

   d. Condition –

   e. Feet and legs –

4. Discuss the major points to consider when selecting feeder pigs.

STUDENT WORKSHEET 3

SELECTING BREEDING SHEEP

1. How is "type" evaluated?

2. How is "producing ability" evaluated?

3. Discuss the characteristics to consider when viewing the lamb from the side.

4. Discuss the characteristics to consider when viewing the lamb from the rear and front.

5. Discuss the factors to consider when handling the lamb.

6. What factors are considered when buying groups of lambs?

STUDENT WORKSHEET 4

SELECTING DAIRY CATTLE

1. When selecting dairy cattle on "type," what should you know?

2. List the desirable physical characteristics when viewing the dairy cow from the side.

3. List the desirable physical characteristics when viewing the dairy cow from the rear and when viewing from the front.

4. What factors should be considered at close range?

5. What information can be useful when selecting dairy cows with their "production records?"

6. What information is obtained on a good "production pedigree" record?

STUDENT JOB SHEET #1

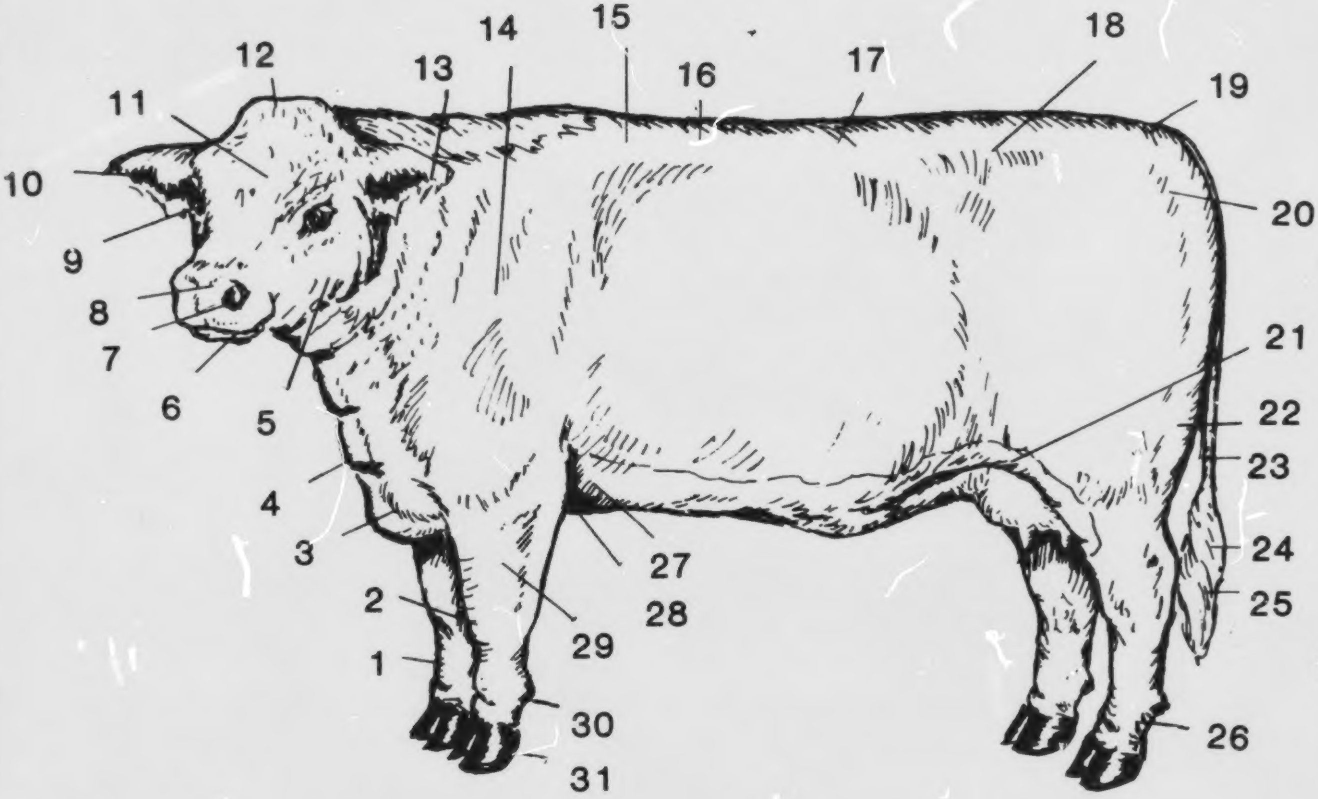
ON

IDENTIFYING PARTS OF LIVE ANIMALS

A. Identify the Parts of the Beef Animal

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______
28. ______
29. ______
30. ______
31. ______

PARTS OF A BEEF ANIMAL



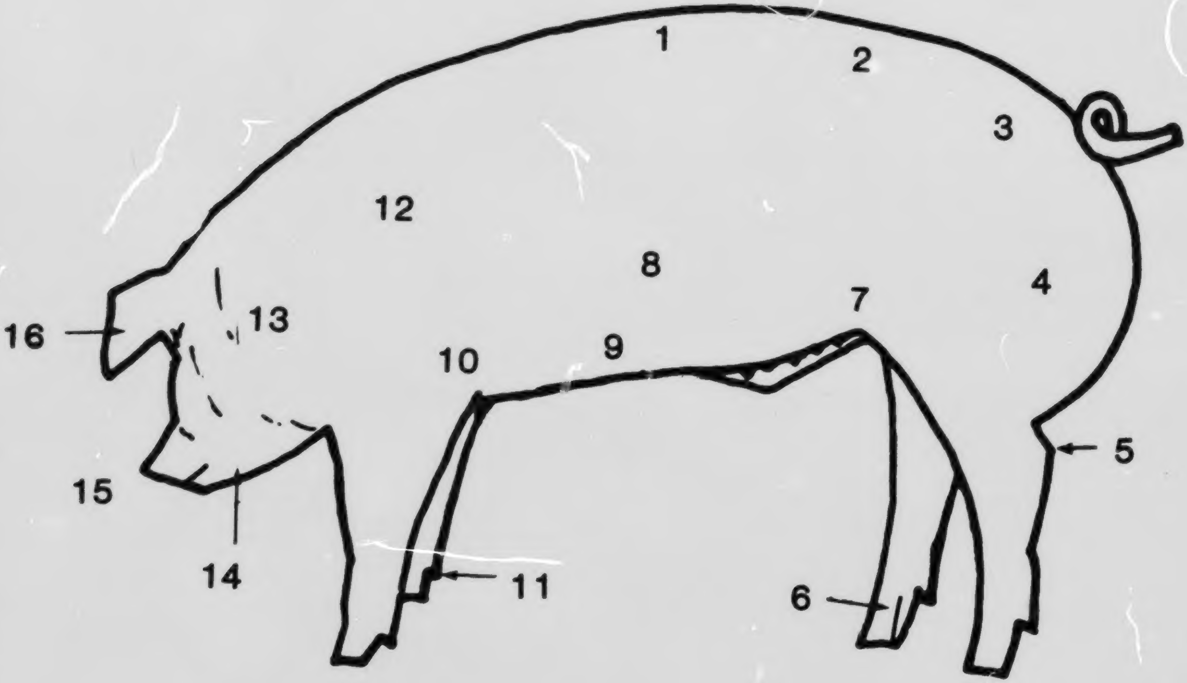
B. Identify Parts of the Meat-Type Hog

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________
11. ____________________
12. ____________________
13. ____________________
14. ____________________
15. ____________________
16. ____________________

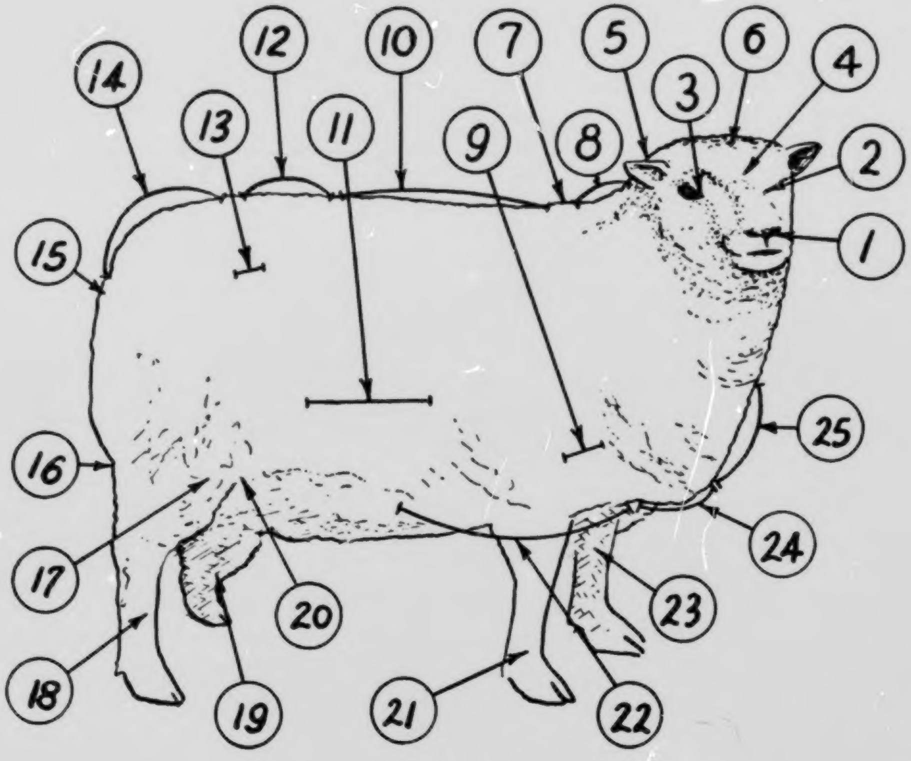
C. Identify Parts of a Sheep

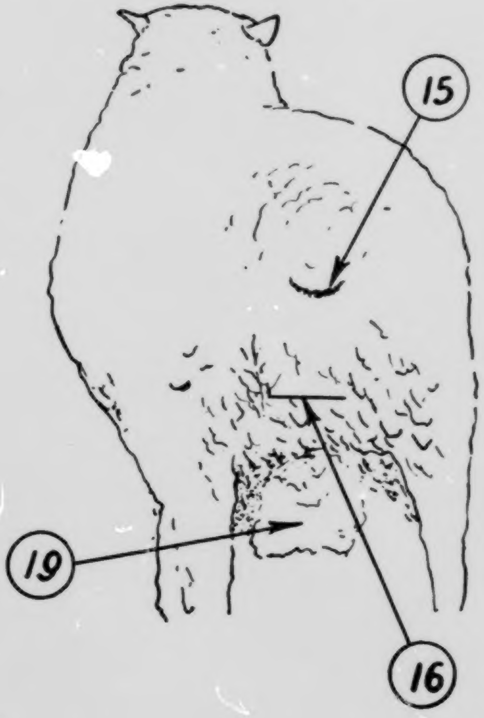
1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________
11. ____________________
12. ____________________
13. ____________________
14. ____________________
15. ____________________
16. ____________________
17. ____________________
18. ____________________
19. ____________________
20. ____________________
21. ____________________
22. ____________________
23. ____________________
24. ____________________
25. ____________________

PARTS OF A HOG



EXTERNAL PARTS OF A SHEEP

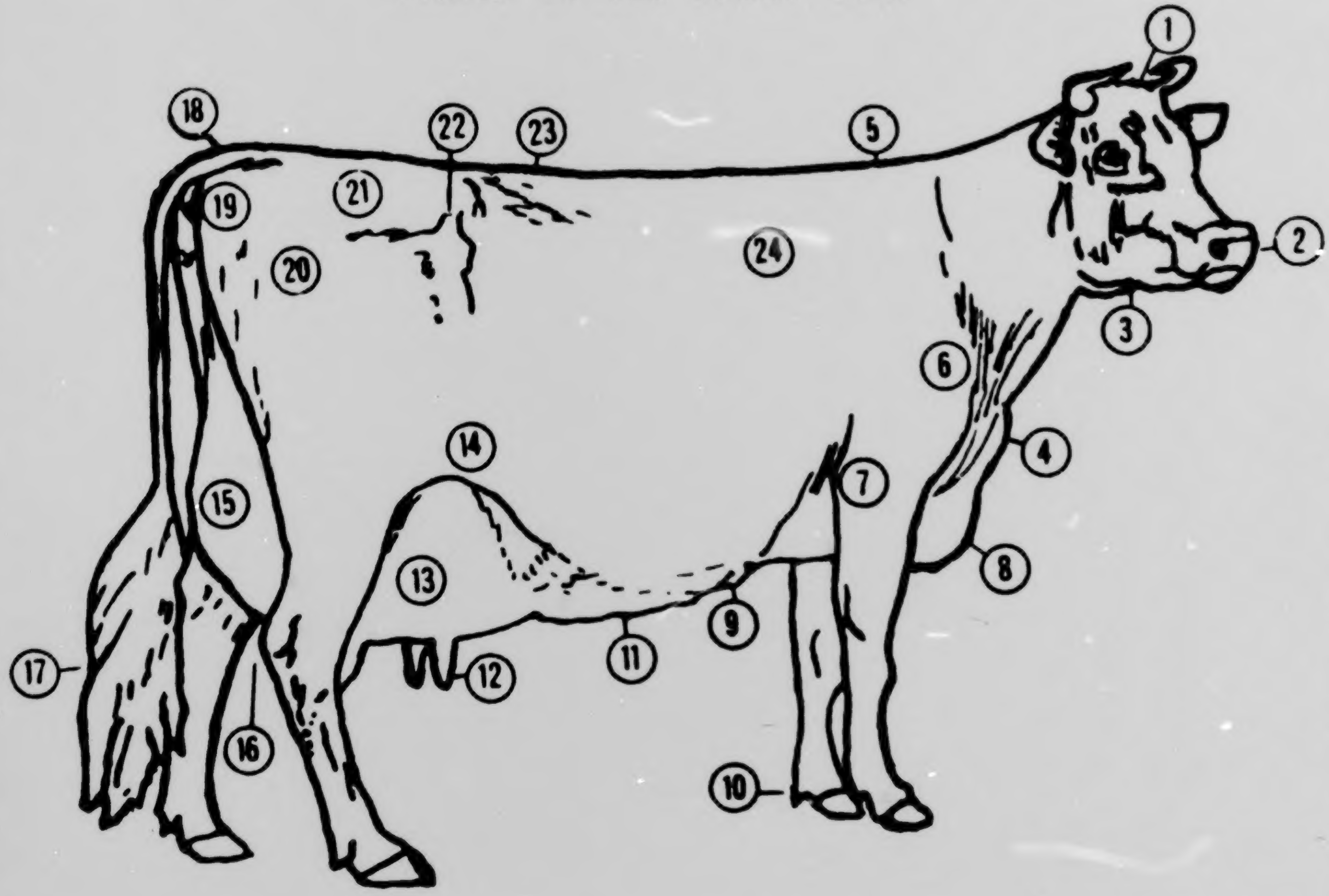




D. Identify Parts of a Dairy Cow

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________
18. ______________________________
19. ______________________________
20. ______________________________
21. ______________________________
22. ______________________________
23. ______________________________
24. ______________________________

PARTS OF THE DAIRY COW



STUDENT JOB SHEET #2

ON

IDENTIFYING WHOLESALE CUTS OF ANIMALS

A. Identify the wholesale cuts of the beef animal and give the approximate percentage of yield of each wholesale cut.

	Name of Cut	Percentage Yield
1.	____________________	______________
2.	____________________	______________
3.	____________________	______________
4.	____________________	______________
5.	____________________	______________
6.	____________________	______________
7.	____________________	______________
8.	____________________	______________
9.	____________________	______________

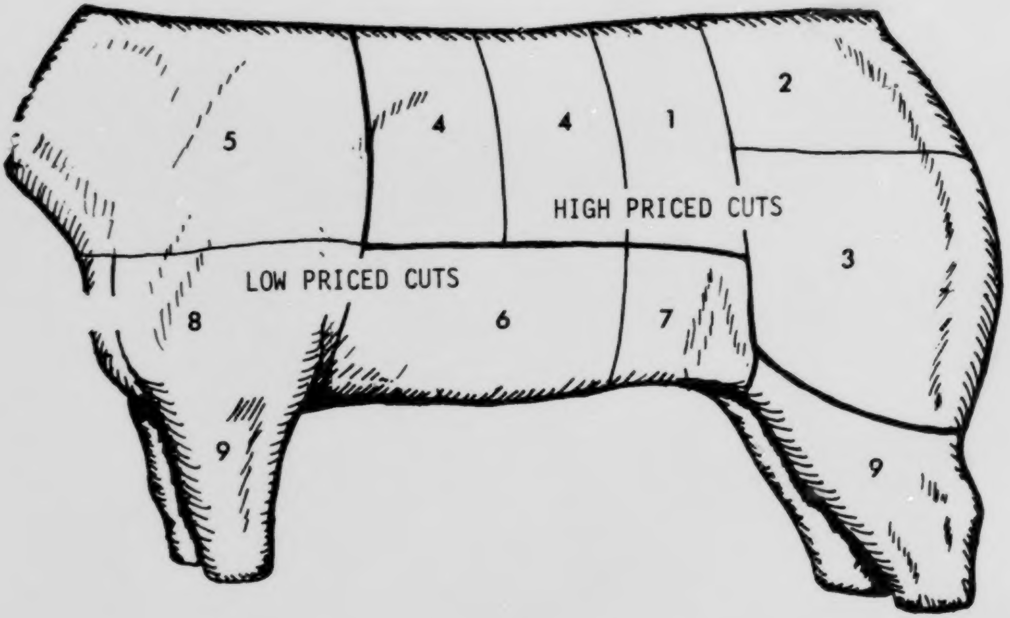
B. Identify the wholesale cuts of pork and give the approximate percentage yield of each wholesale cut.

1.	____________________	______________
2.	____________________	______________
3.	____________________	______________
4.	____________________	______________
5.	____________________	______________

C. Identify the wholesale cuts of lamb and give the approximate percentage yield of each wholesale cut.

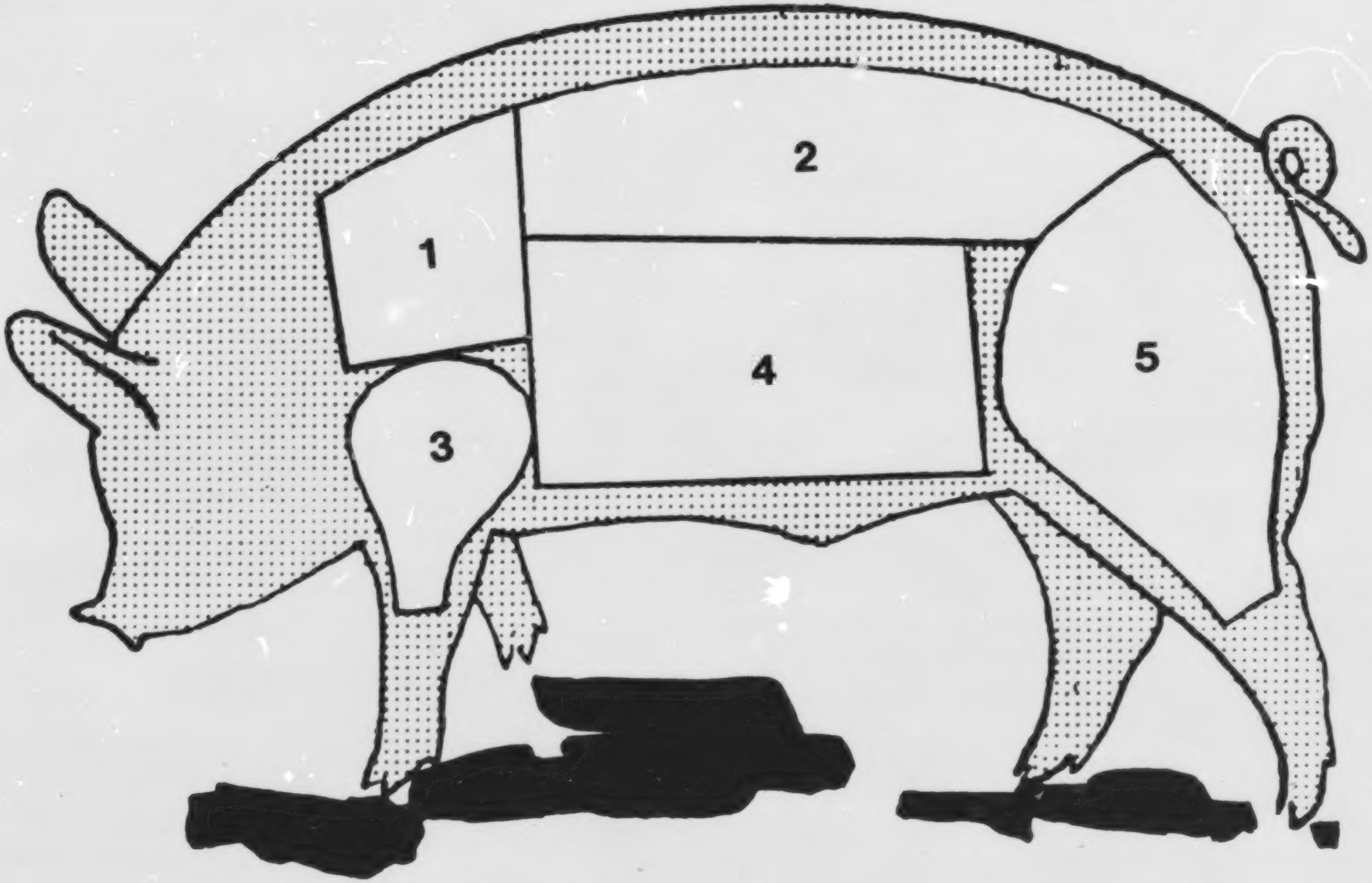
1.	____________________	______________
2.	____________________	______________
3.	____________________	______________
4.	____________________	______________
5.	____________________	______________
6.	____________________	______________

WHOLESALE CUTS OF A BEEF CARCASS

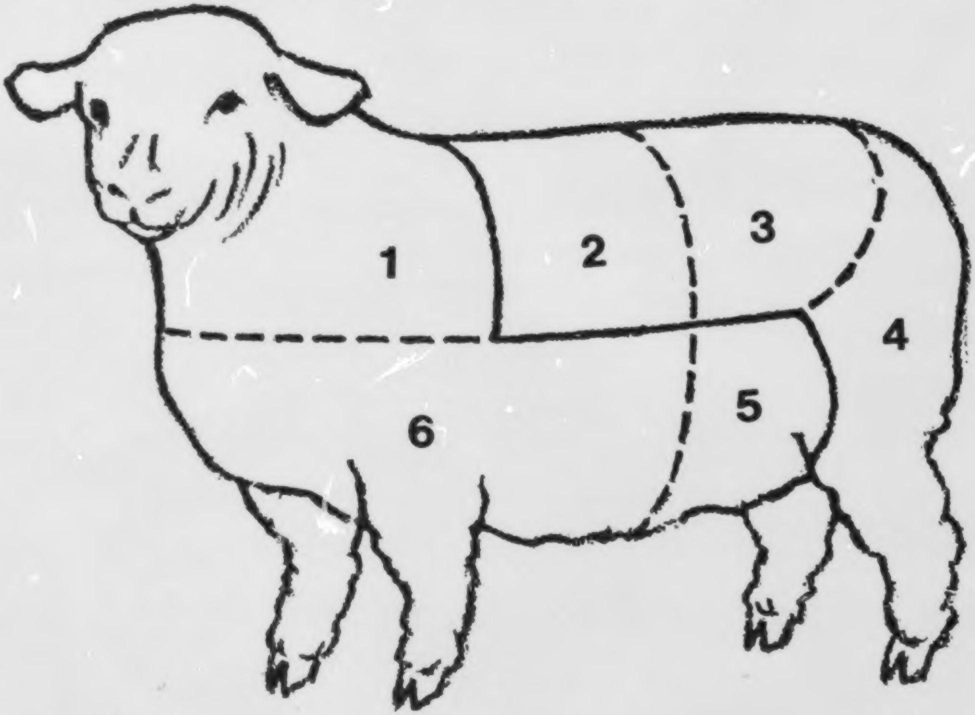


106-A

WHOLESALE CUTS OF PORK



WHOLESALE CUTS OF A LAMB



TEACHER'S KEY
STUDENT WORKSHEET 1

SELECTING BEEF BREEDING ANIMALS

1. List the two factors that selection of beef breeding animals should be based upon.

   a. Type (individuality)

   b. Performance (efficiency)

2. Define type of individuality of a beef breeding animal.

   Ability to produce calves with a maximum amount of high-priced cuts and minimum amount of low priced cuts.

3. What is meant by "desirable breed characteristics?"

   Those characteristics which distinguish one breed from all the other breeds.

4. What factors are considered under "desirable physical characteristics?" (side, rear, front)

   Side – refer to frame No. 33, VAS Filmstrip 100A
   Rear – refer to frame No. 41, VAS Filmstrip 100A
   Front – refer to frame No. 50, VAS Filmstrip 100A

5. What can be determined by handling the animal?

   Fleshing over ribs and back, pliability and quality of hide, fineness of hair.

6. What factors should be considered when "selecting on production?"

   Efficiency of offspring.
   Weaning weights of calves.
   Past production of cow.

TEACHER'S KEY
STUDENT WORKSHEET 2

SELECTING HOGS

1. Why is quality being stressed more today when buying and selling market hogs?

   Packers and other buyers are placing more emphasis on quality and less on weight and finish. USDA has established a set of grades to encourage buying and selling on quality.

2. Why is the meat-type hog more desirable than the short, chuffy animals and the rangy animals?

   More profitable, produce maximum amount of high quality meat cuts, yield minimum lard.

3. The selection of breeding animal by "type" involves looking at various parts of the animal. Briefly discuss each heading giving the desirable type.

   Refer to Part 2 – VAS Unit 1033b.

   a. General appearance –

      Type – size for age – sex characteristics – temperment – breed type.

   b. Conformation –

      Length, width, and depth of animal, as well as fleshing in the loin, hams, and shoulders.

   c. Quality –

      Refinement – bones, fleshing, hair, etc.

   d. Condition –

      Well developed – not fat.

   e. Feet and legs –

      Strong and action free and easy, legs straight, stand on pasterns.

4. Discuss the major points to consider when selecting feeder pigs.

   Healthy, vigorous, intermediate type, large for age, good quality, fairly uniform.

TEACHER'S KEY
STUDENT WORKSHEET 3

SELECTING BREEDING SHEEP

1. How is "type" evaluated?

   Examination of body.

2. How is "producing ability" evaluated?

   Past performance, records of ancestors.

3. Discuss the characteristics to consider when viewing the lamb from the side.

   Refer to frames 15 – 25, VAS Filmstrip 143A.

4. Discuss the characteristics to consider when viewing the lamb from the rear and front.

   Refer to frames 26 – 31 and 32 – 36, VAS Filmstrip 143A.

5. Discuss the factors to consider when handling the lamb.

   Refer to frames 38 – 49 and 51 – 53, VAS Filmstrip 143A.

6. What factors are considered when buying groups of lambs?

   Refer to frames 66 – 68, VAS Filmstrip 143A.

TEACHER'S KEY
STUDENT WORKSHEET 4

SELECTING DAIRY CATTLE

1. When selecting dairy cattle on "type," what should you know?

   A. Desirable breed characteristics
   B. Parts of the animal.
   C. Desirable physical characteristics.

2. List the desirable physical characteristics when viewing the dairy cow from the side.

   Refer to frame 33, VAS Filmstrip 207A.

3. List the desirable physical characteristics when viewing the dairy cow from the rear and when viewing from the front.

   Refer to frame 39 and 44, VAS Filmstrip 207A.

4. What factors should be considered at close range?

   Refer to frame 50, VAS Filmstrip 207A.

5. What information can be useful when selecting dairy cows with their "production records?"

   Refer to frames 56 – 58, VAS Filmstrip 207A.

6. What information is obtained on a good "production pedigree" record?

   Refer to frame 60, VAS Filmstrip 207A.

Teacher's Key To

STUDENT JOB SHEET #1

ON

IDENTIFYING PARTS OF LIVE ANIMALS

A. Identify the Parts of the Beef Animal (Refer to VAS Cattle Transparency #1)

1. shank
2. knee
3. brisket
4. dewlap
5. jaw
6. mouth
7. muzzle
8. nostril
9. eye
10. ear
11. face
12. poll
13. neck
14. shoulder
15. crops
16. back
17. loin
18. hook
19. tail head
20. rump
21. rear flank
22. round
23. tail
24. hock
25. switch
26. pastern
27. fore flank
28. elbow
29. arm
30. dew claw
31. hoof

B. Identify Parts of the Meat-Type Hog (Refer to VAS Swine Transparency #4)

1. back
2. loin
3. rump
4. ham
5. hock
6. pastern
7. rear flank
8. belly
9. underline
10. fore flank
11. dew claw
12. shoulder
13. neck
14. jowl
15. nose
16. ear

C. Identify Parts of a Sheep (Refer to VAS Sheep Transparencies #1 and #2)

1. muzzle
2. face
3. eyes
4. forehead
5. ears
6. poll
7. shoulder-top
8. neck
9. shoulder-side
10. back
11. ribs
12. loins
13. hips
14. rump
15. dock
16. twist
17. thighs
18. legs
19. cod (male) udder (female)
20. flank
21. forelegs (lower)
22. chest
23. forelegs (upper)
24. brisket
25. breast

D. Identify Parts of a Dairy Cow (Refer to Cattle Transparency #4)

1. poll
2. nostril
3. jaw
4. dewlap
5. withers
6. shoulder-point
7. elbow
8. brisket
9. milk wells
10. dew claws
11. milk veins
12. teats
13. fore udder
14. flank
15. rear udder
16. hock
17. switch
18. tail head
19. pin bones
20. thurls
21. rump
22. hook bones
23. loin
24. crops

Teacher's Key To
STUDENT JOB SHEET #2
ON
IDENTIFYING WHOLESALE CUTS OF ANIMALS

A. Identify the wholesale cuts of the beef animal and give the approximate percentage of yield of each wholesale cut. Refer to VAS Transparency #5. NOTE: These percentages are not included in the transparency.

	Name of Cut	Percentage Yield
1.	loin	19%
2.	rump	4%
3.	round	20%
4.	rib	9%
5.	chuck	25%
6.	plate	7%
7.	flank	5%
8.	brisket	4%
9.	shank	3%

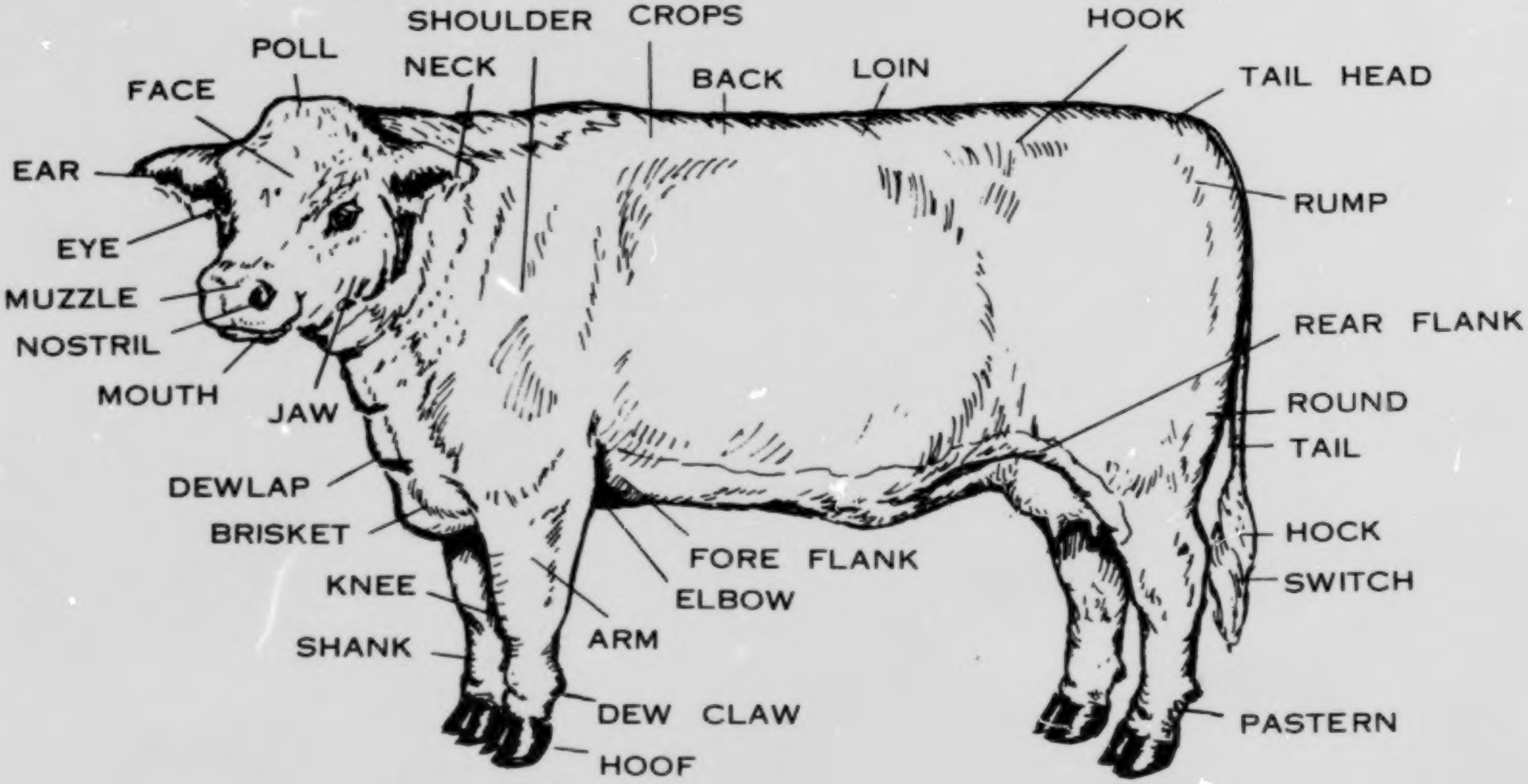
B. Identify the wholesale cuts of pork and give the approximate percentage yield of each wholesale cut.

1.	butt	10%
2.	loin	20%
3.	ham	22-28%
4.	bacon	17%
5.	picnic	13%

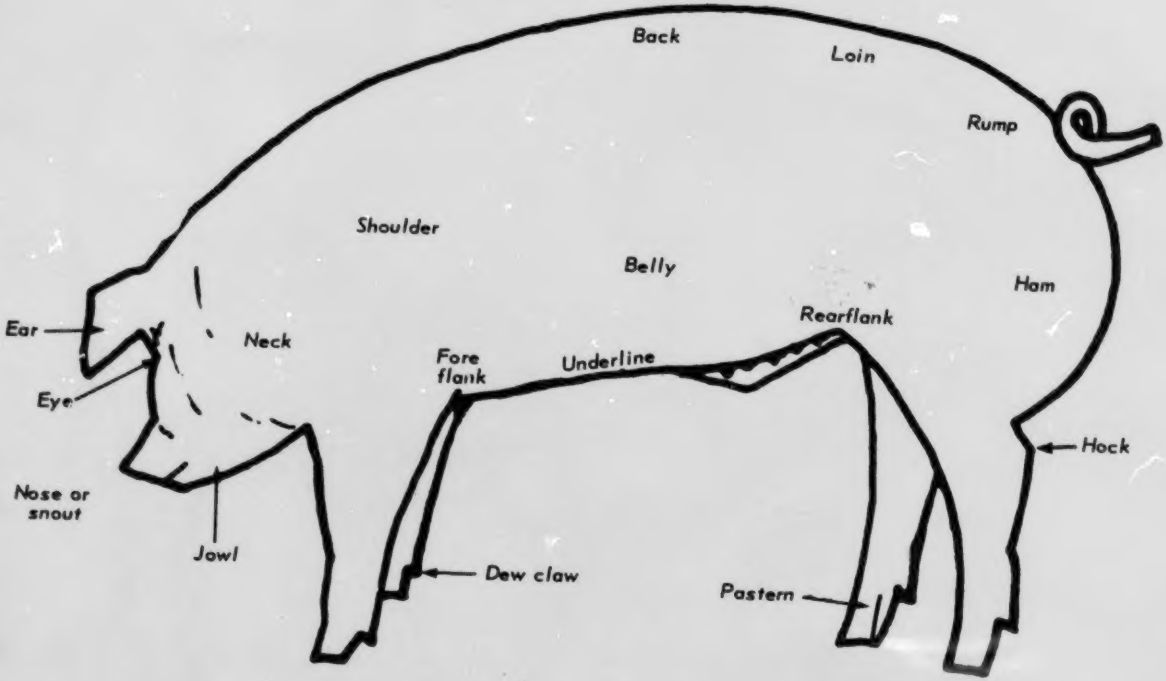
C. Identify the wholesale cuts of lamb and give the approximate percentage yield of each wholesale cut.

1.	shoulder	32%
2.	rack	7%
3.	loin	8%
4.	leg	33%
5.	flank	5%
6.	breast	15%

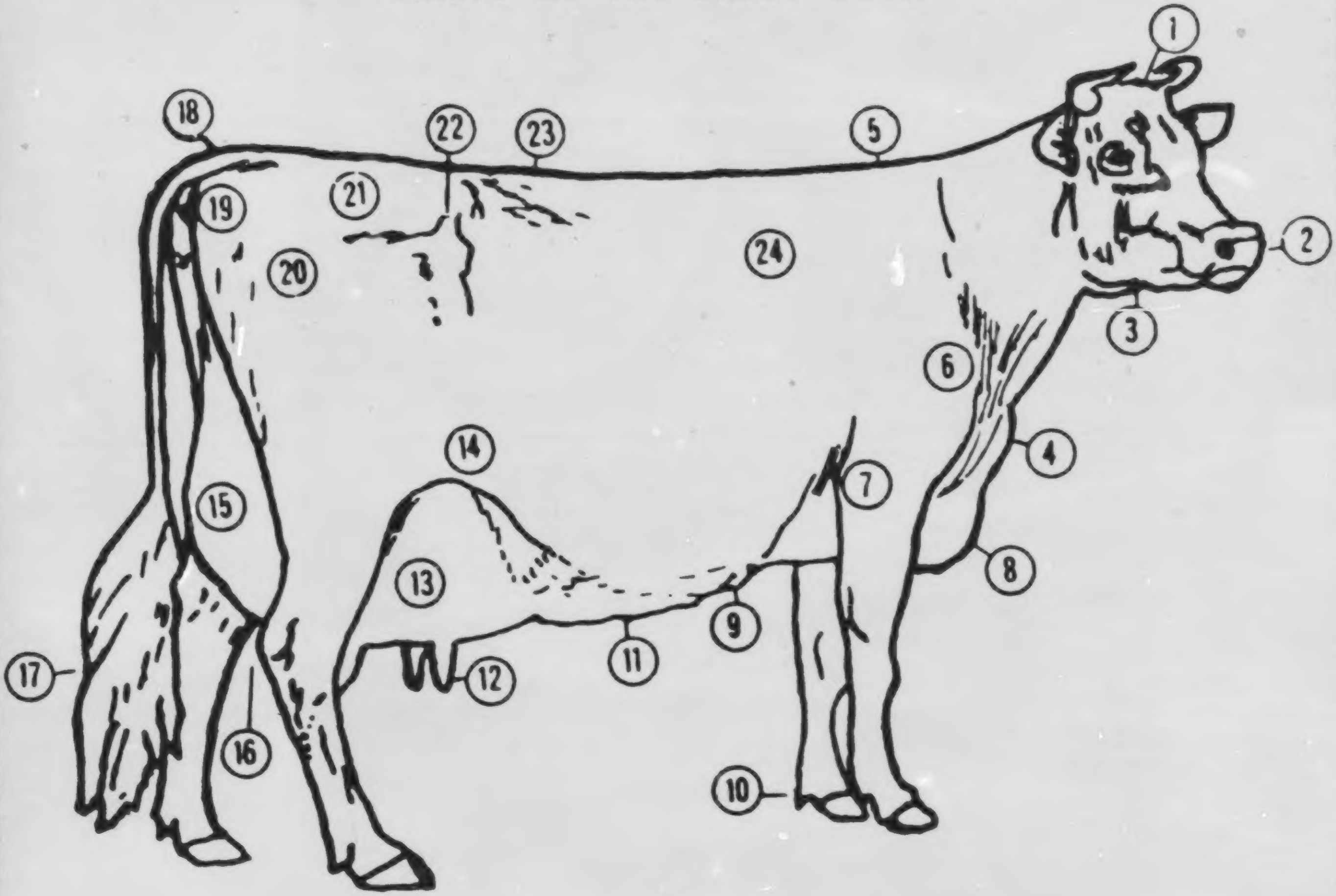
PARTS OF A BEEF ANIMAL



PARTS OF A HOG



PARTS OF THE DAIRY COW



PARTS OF THE DAIRY COW*

1. Poll
2. Nostril
3. Jaw
4. Dewlap
5. Withers
6. Shoulder-Point
7. Elbow
8. Brisket
9. Milk Wells
10. Dewclaw
11. Milk Veins
12. Teats
13. Fore Udder
14. Flank
15. Rear Udder
16. Hock
17. Switch
18. Tail Head
19. Pin Bones
20. Thurls
21. Rump
22. Hook Bones
23. Loin
24. Crops

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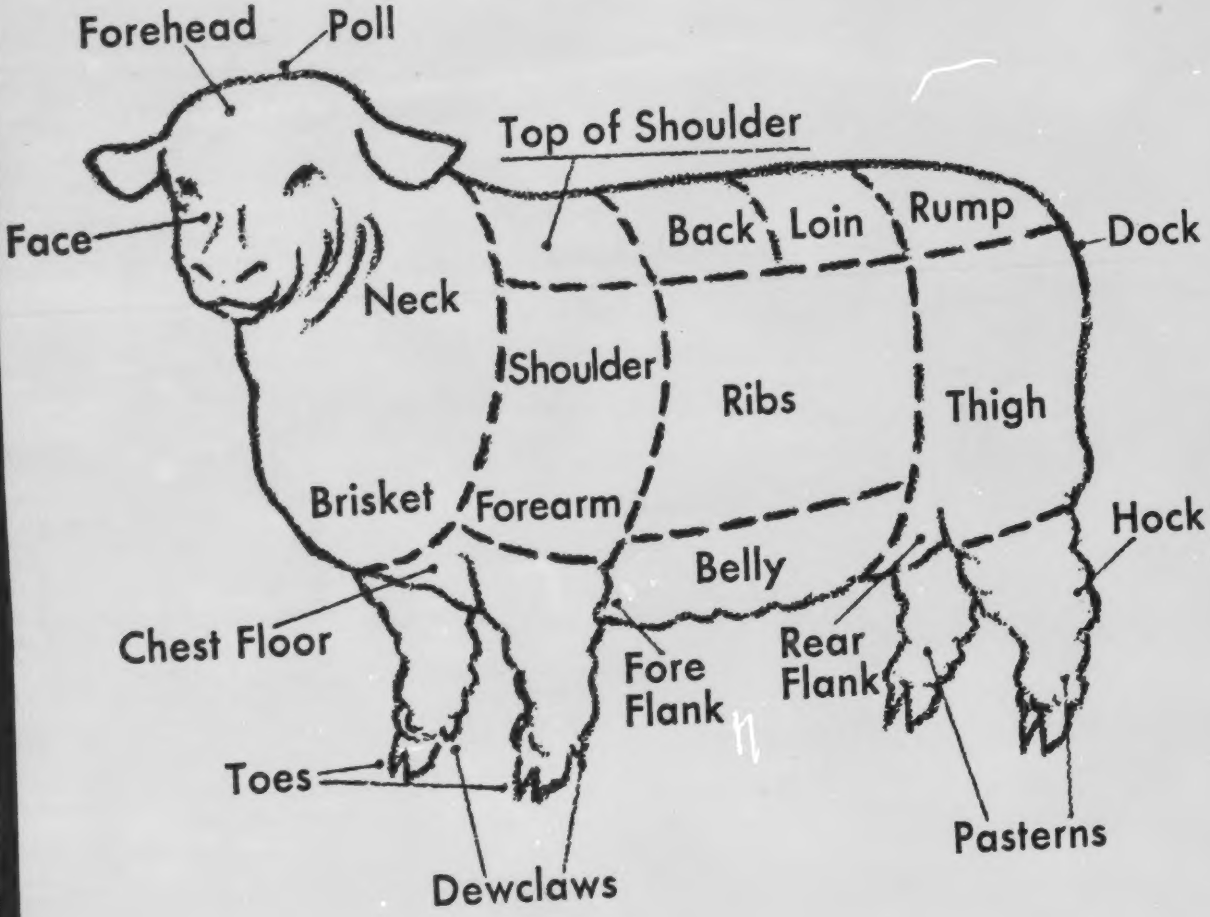
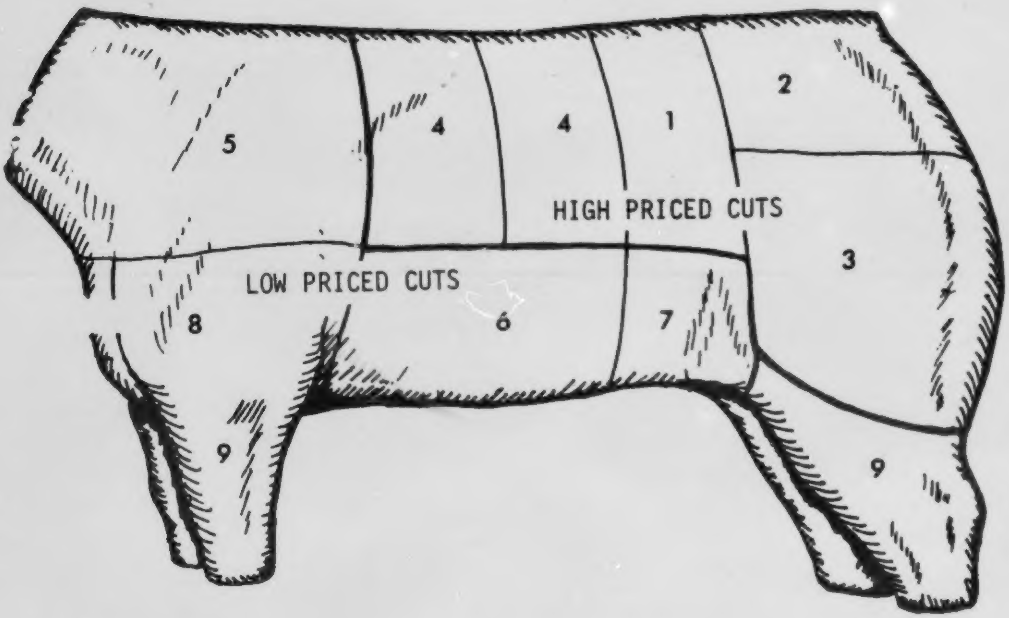
* From "Lesson Plans for Voc. Agr. Instructors" by Vocational Agriculture Services, College Station, Texas.

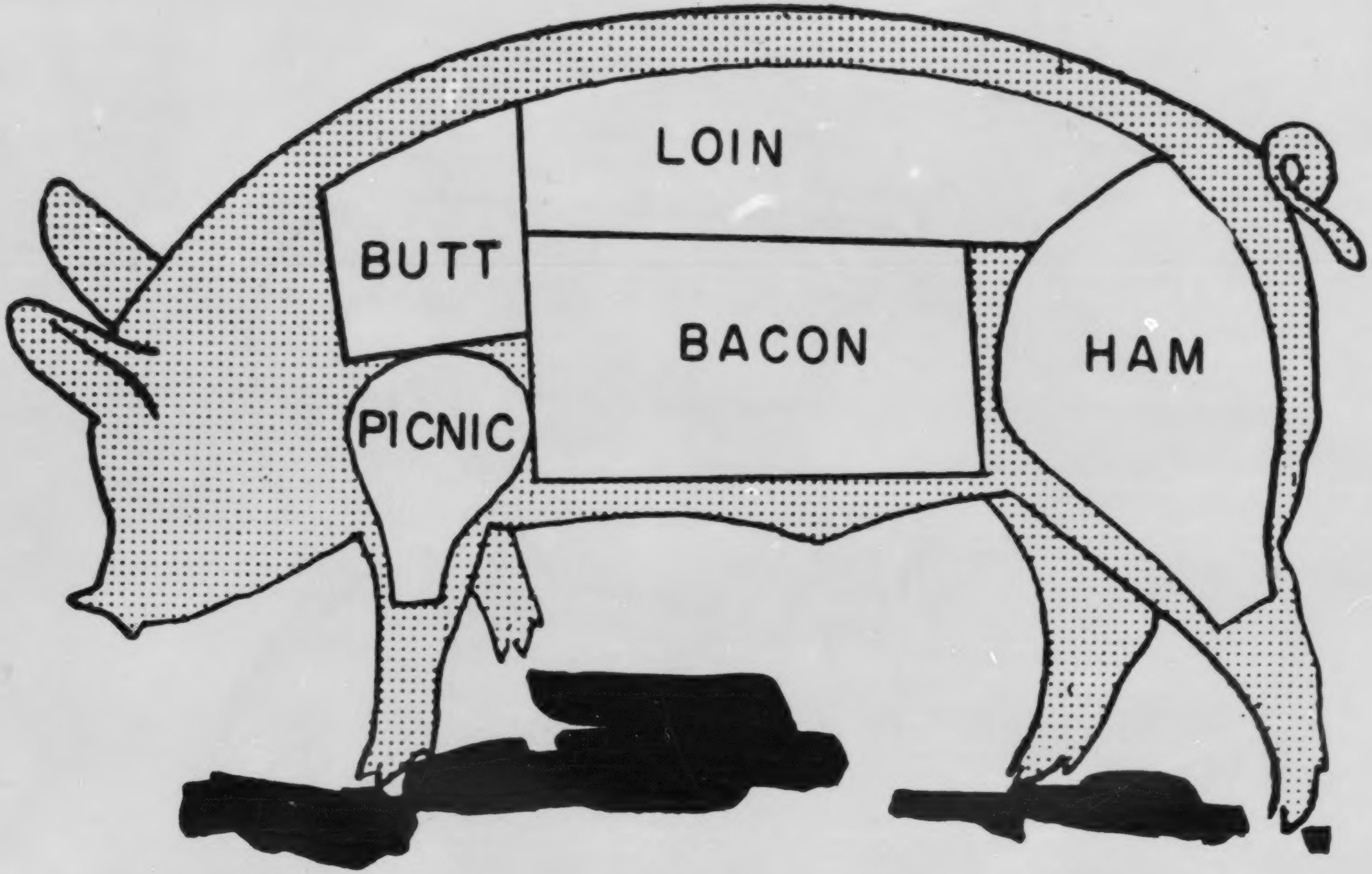
PARTS OF A LAMB



WHOLESALE CUTS OF A BEEF CARCASS



WHOLESALE CUTS OF PORK



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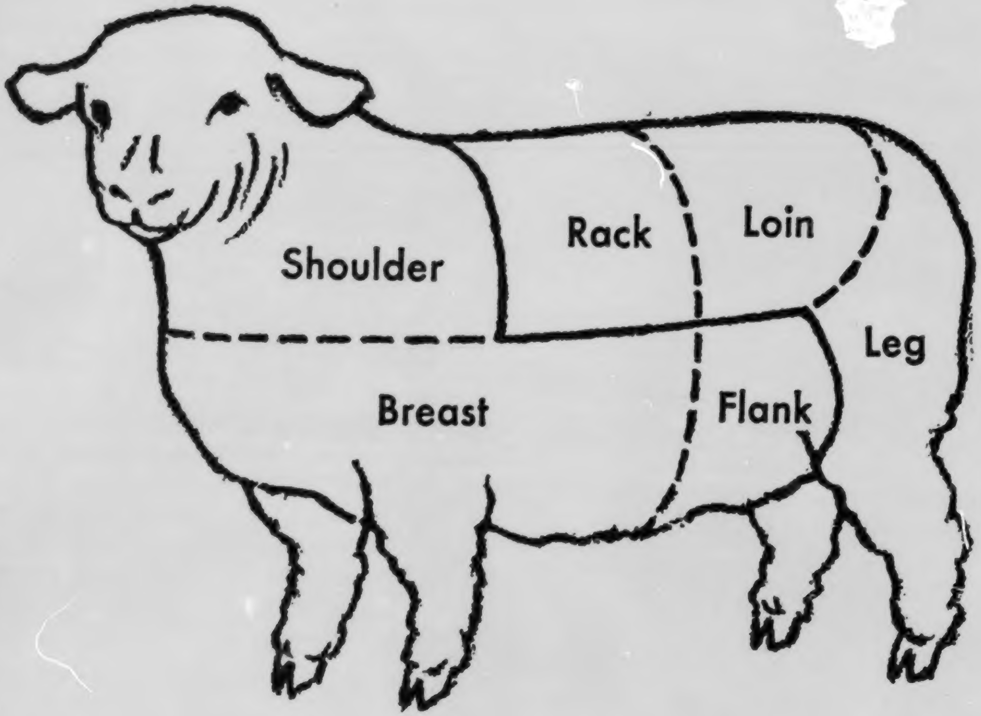
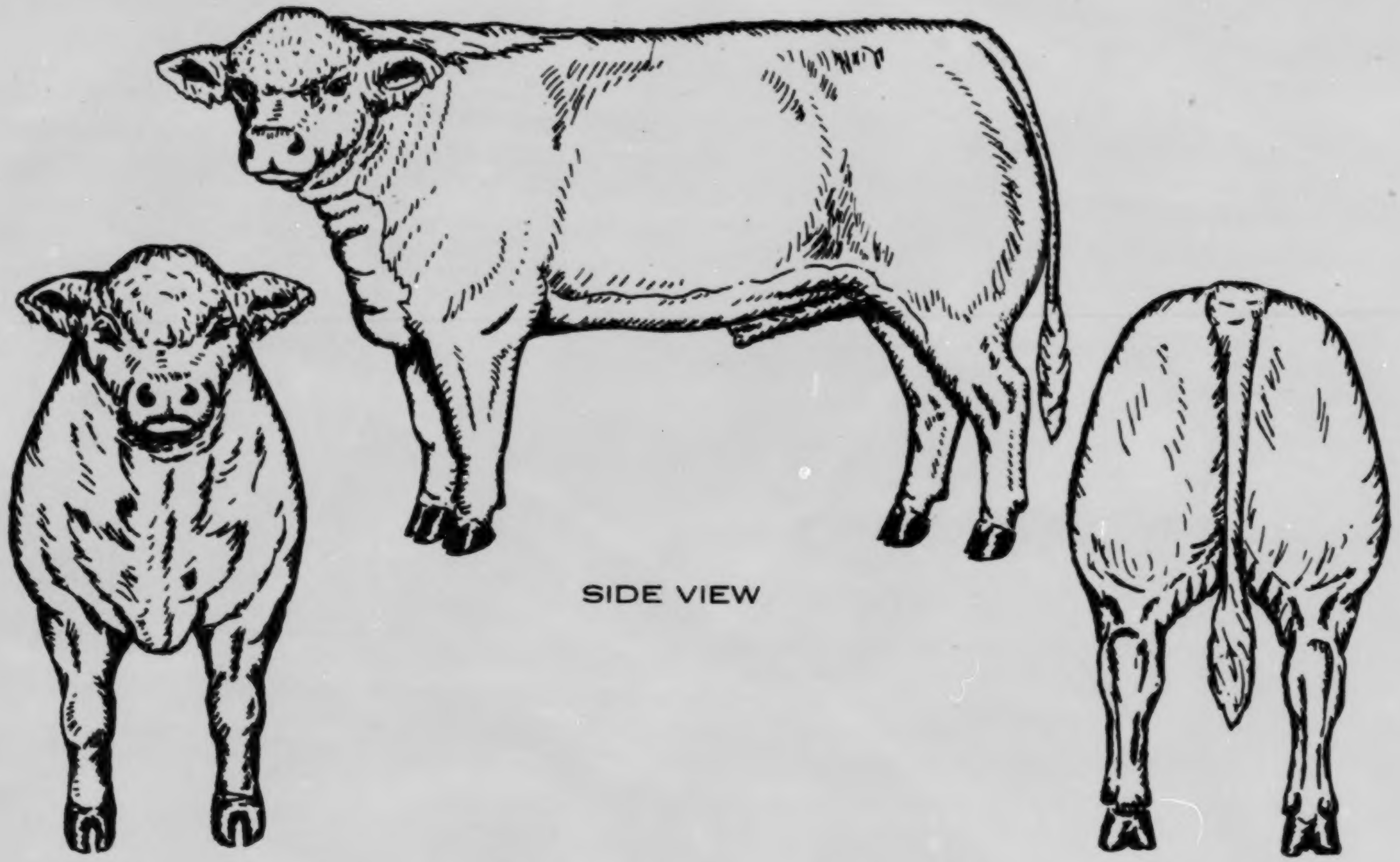
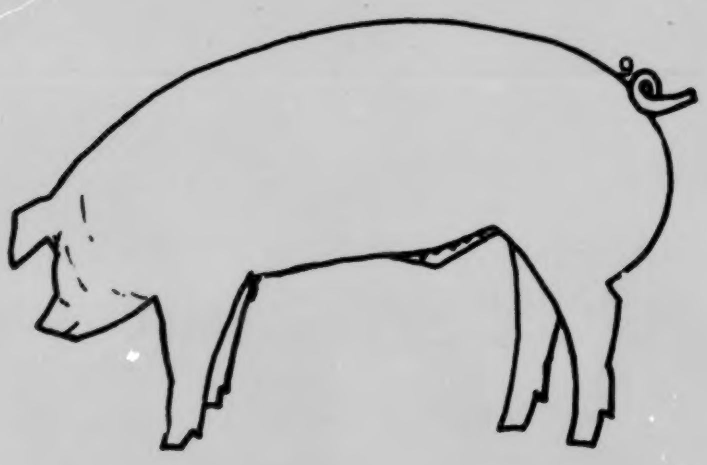
WHOLESALE CUTS OF A LAMB

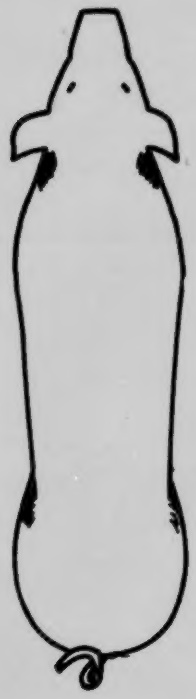


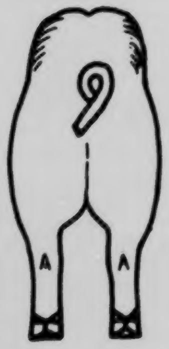
IDEAL BEEF CONFORMATION



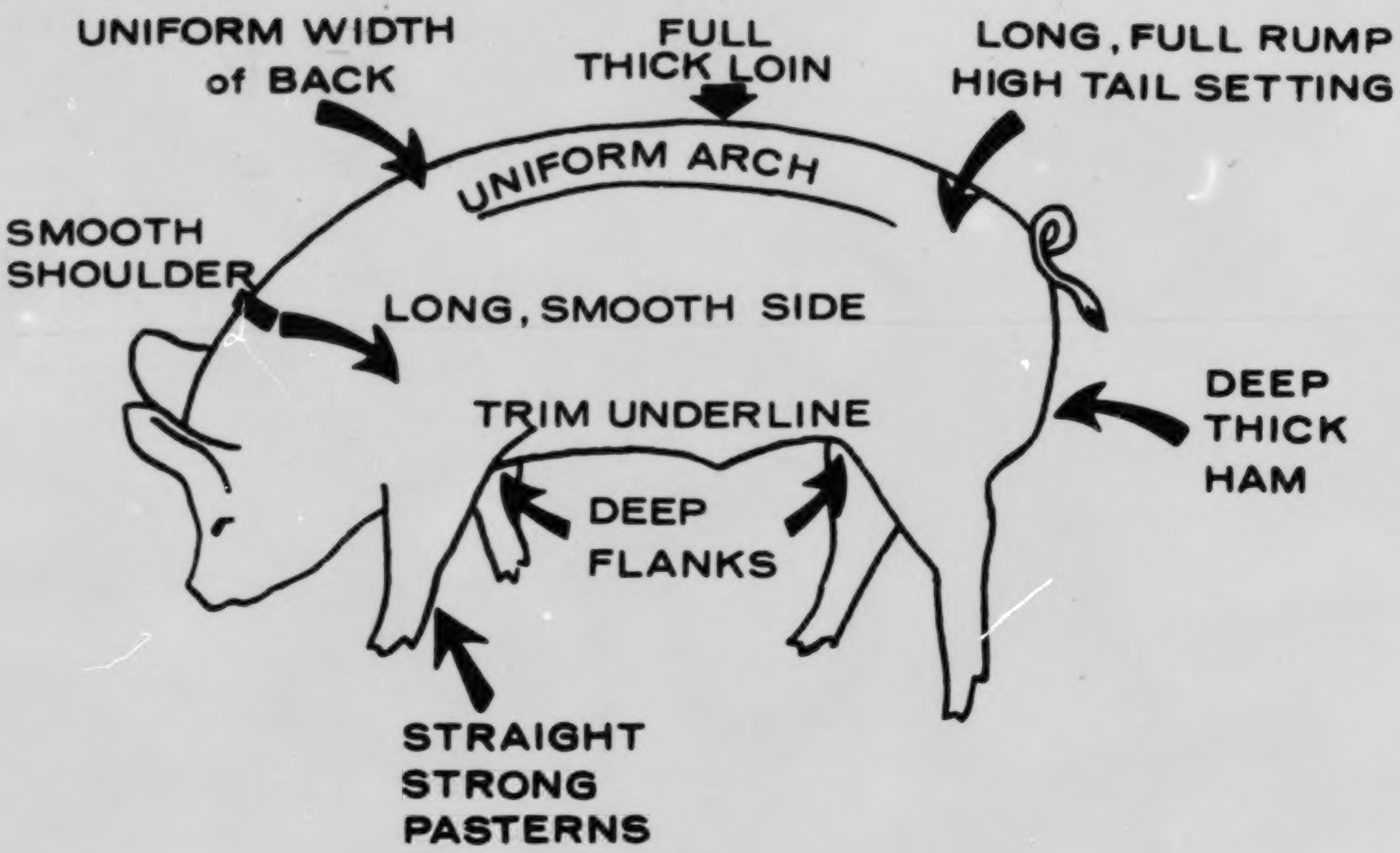
MODERN MEAT TYPE







MAJOR PARTS OF A HOG



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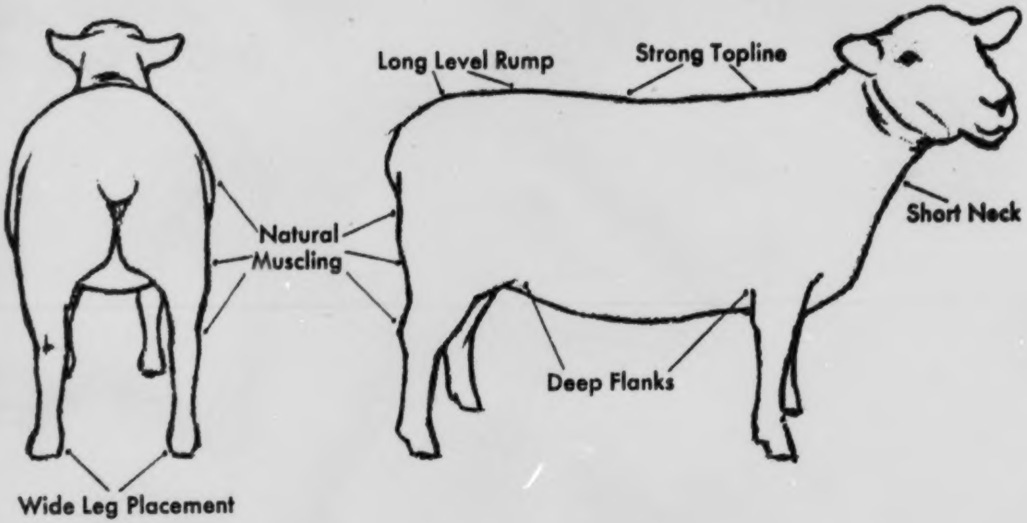
GOOD CONFORMATION



CRITERIA TO USE IN SELECTING BREEDING STOCK

1. GROWTHINESS
2. SOUNDNESS
3. CONFORMATION
4. CONDITION OF BIRTH
5. PREVIOUS PERFORMANCE
6. SUBSTANCE
7. WOOL
8. AGE
9. SEX CHARACTER
10. BREED TYPE

DISCUSSION GUIDE FOR TRANSPARENCIES

SELECTING LIVESTOCK

I. Transparency: **Parts of Live Animals and Wholesale Cuts**

A. Have students identify the parts of live animals. Explain the importance of being able to name the parts when judging live animals and in meat judging and evaluation.

B. Have students identify the wholesale parts of beef, swine and sheep. Identify the high priced cuts and low priced cuts on each specie.

C. Discuss the relationship between the live animal parts and the wholesale cuts when evaluating live market animals. Develop examples of "oral reasons" when explaining how animals were placed in a judging ring.

II. Transparency: **Ideal Animal Conformation**

A. Have students identify the factors which make up an ideal beef, swine, sheep, and dairy animal.

B. Provide practice sessions in picking ideal animals.

C. Explain how the factors used in describing an ideal animal affect the production or market quality of the specie.

D. Develop a list of criteria to use when selecting breeding stock and market animals.

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON JUDGING LIVESTOCK

TRUE (+) - FALSE (0)

__+__ 1. In order to give a good evaluation of the animals in the class or ring, look at the ring of animals from a distance of approximately 25 feet.

__0__ 2. The best indication of muscling in cattle is in the thickness of the shoulder.

__+__ 3. A market steer with correct finish will have a firm, smooth, and uniform fat covering over the back and loin.

__+__ 4. When determining the cuttability or retail value of lambs, the correct finish is very important.

__0__ 5. Approximately one-half of the value of a lamb carcass comes from the leg and loin area.

__+__ 6. An animal when viewed from behind should have good width between the rear legs.

__+__ 7. Boars should have at least 6 well-spaced, prominent nipples on each side of the underline.

__0__ 8. A small amount of finish is undesirable in market hogs.

__+__ 9. Indications of muscling in market lambs are thickness through the center of the leg, bulging stifle and natural thickness over the top.

__0__ 10. A good fleece of breeding sheep should have a distinct uniform crimp and be short stapled.

MULTIPLE CHOICE (Make appropriate choice of A, B. C, or D)

__A__ 1. Type may be defined as:

A. Those characteristics that make an animal best suited for a specific purpose.
B. The way an animal carries himself.
C. An animal that shows rapid gain in weight on as little feed as possible and yields a carcass with a low percentage of lean meat.
D. Characteristics that indicate smoothness and refinement.

B 2. The Swine Associations have adopted the following requirements for a 220 lb. certified meat-type hog:

A. Carcass length of not less than 30.0 inches. Backfat of not more than 1.75 inches. Loin-eye not less than 5.0 square inches.
B. Carcass length of not less than 29.5 inches. Backfat of not more than 1.5 inches. Loin-eye not less than 4.5 square inches.
C. Carcass length of not less than 29 inches. Backfat of not more than 1.25 inches. Loin-eye not less than 4.0 square inches.
D. Any of the above combinations.

D 3. Which of the following best describes a meat-type hog:

A. Rugged boned, low set, wide chested, and deep ribbed.
B. Heavily muscled, low set, narrow chested, long sided deep ribbed.
C. Extremely tall, narrow, light muscled.
D. Large framed, deep ribbed, wide chested, and long sided.

D 4. Which of the following phrases can be used to describe soundness when giving reasons for a class of gilts:

A. Is longer and broodier in her underline.
B. Has more substance of bone.
C. Has more prominent, evenly spaced nipples.
D. All of the above.

D 5. Which of the following are indications of excess fat:

A. Square top.
B. Wasty jowl.
C. Roll of fat behind shoulder.
D. All of the above.

C 6. Today in cattle, yield grade is used to express:

A. Dressing percentage.
B. Marbling in meat cuts.
C. Carcass value.
D. The percent of fat in the carcass.

D 7. When judging market lambs the main points to consider are:

A. Growth, balance, muscling, finish, fleece.
B. Balance, breed type, sex character, fleece quality.
C. Size, quality, carcass value, breed type, fleece.
D. Size, muscling, finish, quality and carcass value.

B 8. For a 220 lb. certified meat-type hog carcass, length may not be less than:

A. 29.25 inches
B. 29.50 inches
C. 29.75 inches
D. 30.00 inches

B 9. When considering fat cover or finish in a class of market cattle the correct amount of finish should be ____ inch over the loin on a 1000 lb. steer.

A. .5 to 1.0
B. .3 to .6
C. .4 to .7
D. .3 to .4

B 10. When viewing a market hog, which of the following gives the best indications of muscling:

A. Hock
B. Ham
C. Shoulder
D. Rib

MATCHING (Match the correct modern phrases with the qualities listed.)

C 1. Growthiness
G 2. Muscling
I 3. Soundness
A 4. Breed type
H 5. Sex character
B 6. Finish
D 7. Carcass (lean yield)
E 8. Type
F 9. Balance and Quality
J 10. Fleece

A. Shows more breed character about her head.
B. Is smoother and more uniformly covered.
C. Shows more weight for age.
D. Would yield a greater percent of ham and loin.
E. Is a more modern meat-type barrow.
F. Has a nicer blending neck and shoulder.
G. Is fuller and deeper in his ham.
H. Shows more masculinity and ruggedness.
I. Stands more correctly on her front and hind legs.
J. Has a longer staple.
K. Is better looking from front and rear.
L. Has more true development.

COMPLETION (Write appropriate information or words to complete statements.)

1. Judging livestock is deciding which animals are most desirable.

2. When starting to judge animals, it is very helpful if you make a mental picture of an ideal animal.

3. Backfat is the best indicator of total fatness of hogs.

4. Loin eye size is obtained by measuring the area of the large loin muscle on a cut made squarely across the loin between the 10th and 11th rib.

5. Ideal finish of a 100 lb. market lamb would be .15 to .20 inch over the loin and back.

6. When viewing the rear quarters of a beef animal, three things to look for are width of round, depth of round, and width between the legs.

7. A steer with correct finish will not have a soft touch or much fat over the upper rib and edge of back.

8. Black fiber is a major problem in some breeds of sheep.

9. Balance refers to how well the parts of the body blend together and implies correctness of structure.

10. Gilts should at least have six well-spaced, prominent nipples on each side of the underline.

ESSAY QUESTIONS

Illustrate and describe how to prepare a paper and take notes for giving reasons on a ring of animals.

(See Pgs. 10-16 of VAS 1019a)

Briefly describe the steps to follow when judging a class of livestock. List these steps in the order they should be done.

1. (See Pgs. 1 & 2 of VAS 1019a)

2.

3.

4.

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON SELECTING AND PURCHASING HOGS

TRUE (+) - FALSE (0)

0 1. The Chester White breed of today would be considered a lard breed.

+ 2. Quality affects market prices of hogs as well as weight and finish.

+ 3. When purchasing animals to start a herd, type and breed should also be considered.

0 4. Meat type animals are compact and low set, and have a tendency to put on fat easily.

0 5. Rangy animals are the most desirable market hogs today.

+ 6. The terms, "lard breeds and bacon breeds," have generally been dropped.

+ 7. Usually, the choice of breed is not nearly as important as the choice of individuals within the breed.

0 8. The sow should be strong in the head, neck, and shoulders.

+ 9. The boar is considered half of the herd and the sows the other half.

0 10. Cryptorchidism is a partial or complete closure or absence of the anus.

MULTIPLE CHOICE (Make appropriate choice of A, B, C, or D)

C 1. Most desirable market hogs today:

A. Short, chuffy animals
B. Rangy animals
C. Meat type (intermediate) animals
D. All of the above

D 2. The original lard breeds:

A. Berkshire
B. Poland China
C. Duroc
D. All of the above

C 3. The original bacon breeds:

A. Yorkshire
B. Tamworth
C. All of the above
D. None of the above

MATCHING (Select the answer that fits the situation best.)

I 1. As indicated by medium size bones, firm flesh, fine hair and absence of wrinkles
F 2. Compact, low set animals that have a tendency to put on fat easily
A 3. Berkshire, Chester White, Duroc, Poland China, and Hampshire
B 4. Includes type, size for age, sex characteristics, temperament, and breed type
D 5. Make the most economical gains for the size of hogs wanted on the market
Q 6. Calm and gentle rather than nervous, cross or irritable
G 7. Purchase from owner at a price agreed upon by the two parties
N 8. Nipples that are inverted back into the the surrounding tissue
P 9. Selling price per 100 pounds necessary to cover feeder pig, feed, and non-feed costs
C 10. Loops of intestines that have passed through the lining of the abdomen, usually at the navel or scrotum

A. Lard breeds
B. General appearance
C. Rupture
D. Meat type hogs
E. Selling price
F. Chuffy
G. Private sale
H. Size for age
I. Quality
J. Rangy
K. Conformation
L. Auction sale
M. Bacon breeds
N. Inverted teats
O. Cryptorchidism
P. Break even price
Q. Temperament
R. Atresia Ani

COMPLETION (Write in the appropriate word or words to complete the statements.)

1. When selecting hogs for either the breeding herd or the feedlot, the characteristics of the ideal market animal should serve as the standard.

2. The breeds of hogs were originally divided into two general groups: the lard and bacon breeds.

3. The hybrid breeds were crosses between other breeds that had been highly inbred.

4. The choice of a breed is usually based on personal preference, although other factors need to be considered also.

5. The animals should be active and vigorous, not sluggish or unduly lazy.

6. The feet and legs of breeding stock should be strong and the action free and easy or the animals may have trouble getting around as they get older.

7. Animals with strong feet and legs stand on pasterns that show quite a bit of slope.

8. If you were buying 50 pound pigs to feed to 225 pounds, and corn was $2.75 per bushel, supplement $15.00 per hundred, and hogs $40.00 per Cwt., you would have to purchase them for $30 per head or less to make any profit.

9. Pigs should be selected on the basis of size for their age, rather than condition or degree of fatness.

10. In deciding whether to keep sows or gilts for the breeding herd, there are usually some tax advantages in keeping gilts.

C 4. Feminine appearance includes:

A. Strong head and neck
B. Strong in the shoulders
C. Well developed udder
D. All of the above

D 5. Desired type of a gilt or sow:

A. Deep throughout
B. Medium in width
C. Moderately tall
D. All of the above

A 6. If you are selecting feeder pigs, be sure they:

A. Are uniform in age, weight, condition, and type
B. Are all the same breed
C. Have registration papers
D. Have their ears' notched

B 7. The auction sale that probably has the most advantages for the buyer is:

A. Dispersal sale
B. Disposal sale
C. Private sale
D. General farm sale

A 8. An inherited defect that should disqualify a gilt from the breeding herd of market animals is:

A. Inverted teats
B. Cryptorchidism
C. Stub tail
D. White spots on back

D 9. An inherited characteristic of swine that should be guarded against but would not necessarily adversely effect the animal in the feedlot or on the market:

A. Swirls
B. Extra toes
C. Screw tails
D. All of the above

B 10. Before selecting a boar pig for the breeding herd, be sure to study:

A. His production data
B. Production data of his sire and dam
C. The ration that he has been getting
D. The building that he has been sleeping in

ESSAY QUESTIONS

1. Explain the advantages and disadvantages of purchasing breeding or feeding stock from a private sale, dispersal sale, disposal sale, consignment sale, or general farm sale.

(See page 6 of VAS 1033b)

2. List and describe four inherited defects of swine that should disqualify an animal from the breeding herd.

(See page 7 of VAS 1033b)

UNIT D: LIVESTOCK SCIENCE

PROBLEM AREA: FEEDING LIVESTOCK

SUGGESTIONS TO THE TEACHER:

The problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is during the winter. The estimated time for teaching this problem area is 5 to 10 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. That agriculture students need to understand the functions of the various parts of the ruminant and non-ruminant digestive system.
2. That it is important that agriculture students appreciate the importance of providing balanced rations which are based on the needs of various types of livestock.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

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The teacher's guide and worksheets were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and test questions were prepared by Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Livestock science

II. Problem area: Feeding livestock

III. Objectives: At the close of this problem area the student will be able to:

1. List and explain the functions of the four major parts of the digestive system.
2. List and explain the functions of the four major parts of the ruminant stomach.
3. Name the six classes of nutrients.
4. Explain the functions of each class of nutrients.
5. Explain the characteristics of a good ration.
6. Explain the rules of thumb that should be used as a guide when formulating rations.
7. Prepare a ration for protein content using the Pearson Square Method.

IV. Suggested interest approaches:

1. Take the class on a field trip to a slaughter house so they can see the parts of a digestive system.
2. Show the film, "The Rumen Story," available from U. of I. and SIU film libraries. Obtain university film catalogs and order forms through your instructional resource center.
3. Bring feed samples into class and have students try to identify the contents.
4. Hand out feed tags and have students identify the nutrient content of each feed stuff.
5. Ask students to explain what they feed their livestock and the guidelines used to select the specific feed stuff.
6. Invite a feedmill operator to class to discuss the mixing of feed rations for livestock.

V. Anticipated problems and concerns of students:

1. What are the parts of the digestive system?
2. What are the parts of the ruminant stomach?
3. What is the function of each part of the digestive system?
4. What are enzymes and what do they do?
5. What is a ration?
6. What is a balanced ration?
7. What are nutrients and their functions?

8. What are the characteristics of a good ration?

9. What is the difference between a concentrate and a roughage?

10. What "rules of thumb" are used in feeding livestock?

11. How do you balance a ration using the Pearson Square Method?

VI. Suggested learning activities and experiences:

1. Distribute VAS Unit 1026a "Digestion in Animals" and have students tentatively answer the identified problems and concerns.

2. Identify and define the important terms related to livestock feeding.

3. Show transparencies on the parts of the digestive system and discuss the functions of each part.

4. Identify and discuss the purposes and characteristics of good rations.

5. Hand out Student Worksheet 1, Digestion in Animals, and have students complete and turn in for evaluation.

6. Hand out Student Worksheet 2, General Facts on Livestock Feeding, and have students complete and turn in for evaluation.

7. Hand out Student Worksheet 3, Balancing the Rations, and have students work through the suggested exercises.

8. Have students formulate a ration for their S.O.E. Project.

VII. Suggestions for using this problem area:

1. The main purpose of this problem area is to introduce the students to correct feeding procedures for their S.O.E. projects.

2. This problem area should provide students with basic information on digestion and the classes and functions of feed nutrients.

VIII. Evaluation:

1. Collect and grade worksheets.

2. Evaluate student's ability to use Pearson Square Method to formulate a feed ration.

3. Administer and evaluate an exam on digestion and feeding.

IX. References and aids:

1. VAS Unit 1026a, Digestion in Animals

2. VAS Unit 1013a, General Facts on Livestock Feeding

3. Worksheets 1, 2, and 3

4. Transparencies

5. Sample test questions

STUDENT WORKSHEET 1

DIGESTION IN ANIMALS

1. Define digestion

2. The tube-like passage from the mouth to the stomach is called the ________________________.

3. The four divisions of the ruminant stomach are ____________________, ____________________,

   ____________________ and ____________________.

4. The part of the digestive system where most digestion is completed and most absorption takes place is the ________________________.

5. How can the horse digest roughage since it has a simple stomach?

6. The ____________________________________ produces bile and is the largest gland in the body.

7. What is the first step in digestion?

8. Discuss how digestion in the stomach of a ruminant is different than digestion in a non-ruminant.

9. What three digestive juices are mixed with the "chyme" when in the small intestine?

10. Describe how the digested foodstuff is absorbed by the small intestine.

STUDENT WORKSHEET 2

GENERAL FACTS ON LIVESTOCK FEEDING

1. Why do animals need nutrients?

2. List and give the functions of the six classes of nutrients.

   a.

   b.

   c.

   d.

   e.

   f.

3. What is the difference between a "good ration" and a "balanced ration?"

4. Briefly state the "rules-of-thumb" to use when formulating rations for:

   a. Beef Cattle –

   b. Dairy Cattle –

   c. Swine –

   d. Sheep –

   e. Poultry –

5. List some recommended practices in providing water for livestock.

6. Feed costs make up about _______________ percent of the total cost of producing an animal.

STUDENT WORKSHEET 3

BALANCING A RATION

1. Obtain a copy of a standard feedstuff composition table and answer the following:

A. Fill in the fiber content of these feedstuffs:

100 lbs. corncobs. ground ________% ________lbs.

100 lbs. timothy hay, fullbloom ________ % ________lbs.

56 lbs. corn, dent No. 2 ________ % ________ lbs.

50 lbs. fishmeal, all analysis ________% ________lbs.

50 lbs. soybean meal, solvent process ________% ________lbs.

B. Fill in the protein content:

	Total protein %	Digestible Protein %
34 lbs. oats, usual grade		
56 lbs. corn, dent No. 2		
50 lbs. soybean meal, solvent		
100 lbs. timothy hay, fullbloom		
100 lbs. corncobs, ground		

2. Balance the following rations using the Pearson Square Method. Show % of each foodstuff and amount per ton.

A. 20% ration using corn 8% crude protein and soybean meal 45% crude protein.

B. 10% ration using grain sorghum 7% crude protein and bloodmeal 80% crude protein.

C. 15% ration using equal parts of corn 7% and wheat 9% crude protein, and equal parts of soybean meal 45% and fishmeal 65% crude protein.

TEACHER'S KEY
STUDENT WORKSHEET 2

GENERAL FACTS ON LIVESTOCK FEEDING

1. Why do animals need nutrients?

   Maintenance, growth, finishing, production, reproduction.

2. List and give the functions of the six classes of nutrients.

   a. Carbohydrates (Refer to VAS transparency "Sources of Energy.")

   b. Proteins

   c. Fats

   d. Minerals

   e. Vitamins

   f. Water

3. What is the difference between a "good ration" and a "balanced ration?"

   Refer VAS 1013a, Part 2

4. Briefly state the "rules-of-thumb" to use when formulating rations for:

   Refer VAS 1013a, Part 3

   a. Beef Cattle –

   b. Dairy Cattle –

   c. Swine –

   d. Sheep –

   e. Poultry –

5. List some recommended practices in providing water for livestock.

   Clean
   Adequate supply

6. Feed costs make up about 70% percent of the total cost of producing an animal.

TEACHER'S KEY
STUDENT WORKSHEET 1

DIGESTION IN ANIMALS

1. Define digestion.

2. The tube-like passage from the mouth to the stomach is called the __esophagus__.

3. The four divisions of the ruminant stomach are __rumen__, __reticulum__, __omasum__ and __abomasum__.

4. The part of the digestive system where most digestion is completed and most absorption takes place is the __small intestine__.

5. How can the horse digest roughage since it has a simple stomach?

   Active and large caecum digests the roughage, acts similar to the rumen.

6. The __liver__ produces bile and is the largest gland in the body.

7. What is the first step in digestion?

   Breaking, cutting, and tearing up of food.

8. Discuss how digestion in the stomach of a ruminant is different than digestion in a non-ruminant.

   Refer VAS 1026a, part 3.

9. What three digestive juices are mixed with the "chyme" when in the small intestine?

   Pancreatic juice, bile, intestinal juice.

10. Describe how the digested foodstuff is absorbed by the small intestine.

    Refer VAS 1026a, Part 6

TEACHER'S KEY
STUDENT WORKSHEET 3

BALANCING A RATION *

1. Obtain a copy of a standard feedstuff composition table and answer the following:

   A. Fill in the fiber content of these feedstuffs:

   100 lbs. corncobs. ground 32 % 32 lbs.

   100 lbs. timothy hay, fullbloom 30.3 % 30.3 lbs.

   56 lbs. corn, dent No. 2 2.2 % 1.23 lbs.

   50 lbs. fishmeal, all analysis .9 % .45 lbs.

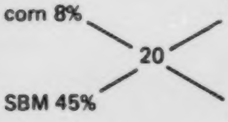
   50 lbs. soybean meal, solvent process 5.9 % 2.95 lbs.

   B. Fill in the protein content:

	Total protein %	Digestible Protein %
34 lbs. oats, usual grade	5.5	4.0
56 lbs. corn, dent No. 2	9.5	7.1
50 lbs. soybean meal, solvent	46.4	39.4
100 lbs. timothy hay, fullbloom	6.2	3.2
100 lbs. corncobs, ground	2.3	.4

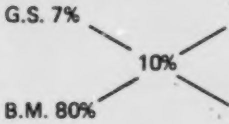
2. Balance the following rations using the Pearson Square Method. Show % of each foodstuff and amount per ton.

   A. 20% ration using corn 8% crude protein and soybean meal 45% crude protein.



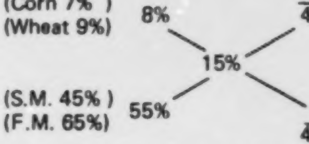
Parts	%	lbs./ton
25	67.5	1350
12	32.5	650
37	100%	2000 lbs.

   B. 10% ration using grain sorghum 7% crude protein and bloodmeal 80% crude protein.



Parts	%	lbs./ton
70	96	1920
3	4%	80
73	100%	2000 lbs.

   C. 15% ration using equal parts of corn 7% and wheat 9% crude protein, and equal parts of soybean meal 45% and fishmeal 65% crude protein.



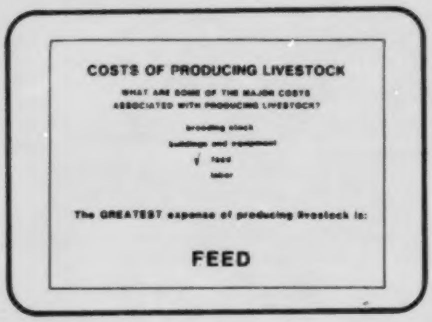
Parts	Parts	%	lbs./ton
40	20 corn	42.5	850 lbs. corn
	20 wheat	42.5	850 lbs. wheat
7	3.5 S.M.	7.5	150 lbs. S.M.
	3.5 F.M.	7.5	150 lbs. F.M.
47	47	100%	2000 lbs.

* Answers will vary depending on information source.

ANIMAL NUTRITION

ANIMAL
NUTRITION

1. Good nutrition is one of the basic considerations of modern livestock production. Good nutrition involves the wise use of available feedstuffs in formulating a palatable, least-cost, and nutritionally balanced ration for livestock. Today's livestock producer should be familiar with the basic concepts of good nutrition.



COSTS OF PRODUCING LIVESTOCK

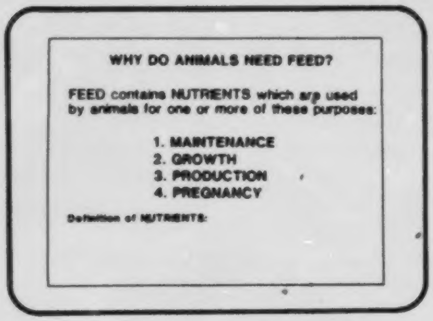
WHAT ARE SOME OF THE MAJOR COSTS
ASSOCIATED WITH PRODUCING LIVESTOCK?

breeding stock
buildings and equipment
√ feed
labor

The GREATEST expense of producing livestock is:

FEED

2. The costs associated with the production of livestock include: purchase price of breeding or feeder stock, buildings, equipment, land, feed, labor, interest on capital investment, etc. The largest of these expenses is feed. It may range from 60 to 80% of the total production costs.



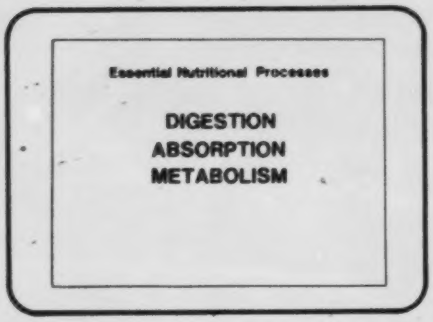
WHY DO ANIMALS NEED FEED?

FEED contains NUTRIENTS which are used by animals for one or more of these purposes:

1. MAINTENANCE
2. GROWTH
3. PRODUCTION
4. PREGNANCY

Definition of NUTRIENTS:

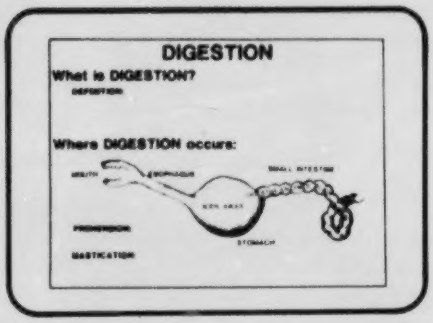
3. Animals must have the **nutrients** provided by feed ingredients in order to survive. These nutrients are used for **maintenance, growth, production, and pregnancy**. Nutrients may be defined as: "The chemical substances found in feed materials that are necessary for proper body functioning."



Essential Nutritional Processes

DIGESTION
ABSORPTION
METABOLISM

4. Nutrients found in feeds are not immediately available for use by the animal's body. These nutrients must be changed through three essential body processes into a usable form. These processes are **digestion, absorption, and metabolism**.



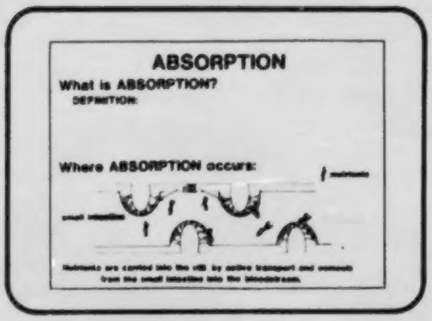
DIGESTION

What is DIGESTION?

DEFINITION:

Where DIGESTION occurs:

5. **Digestion** is: "The process in which feed particles are physically broken down and chemically converted into food nutrients that can be absorbed. It includes all activities of the digestive tract and its glands." Digestion begins immediately after **prehension** (the act of bringing food into the mouth) and ends when the food nutrient is absorbed into the animals blood stream. **Mastication** is the act of chewing food. It involves the physical grinding and tearing of feed into small particles. **Saliva** is added which begins certain enzyme reactions. Additional acids and digestive secretions are added by other parts of the digestive tract to aid in digestion.



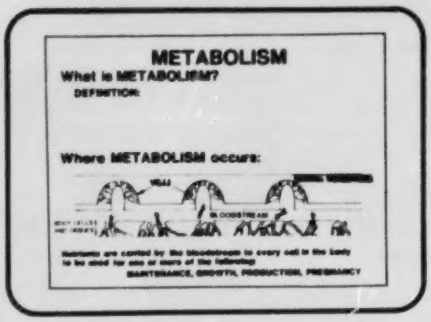
ABSORPTION

What is ABSORPTION?

DEFINITION:

Where ABSORPTION occurs:

6. **Absorption** is: "The process by which food nutrients enter the animal's bloodstream." Absorption occurs primarily in the small intestine. Some absorption occurs in the large intestine, the rumen in ruminants, and the cecum in horses. Microscopic finger-like protrusions called **villi** line the walls of the small intestine. Nutrients are carried into the villi by **active transport** and **osmosis**. They are then carried by capillaries (tiny blood vessels) into the bloodstream, and then to all parts of the body.



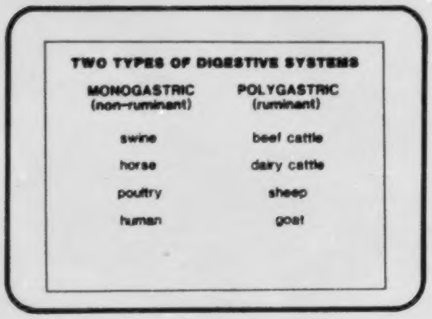
METABOLISM

What is METABOLISM?

DEFINITION:

Where METABOLISM occurs:

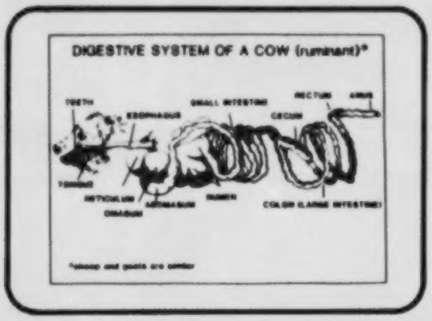
7. **Metabolism** is: "The sum of all the processes and changes that take place in food nutrients after they have been absorbed from the digestive tract." These processes take place in every cell of the body. They include both the "building-up" process (anabolism) in which nutrients are used for formation and repair of body tissues; and the "breaking down" processes (catabolism) in which nutrients are used for the production of heat and work.



TWO TYPES OF DIGESTIVE SYSTEMS

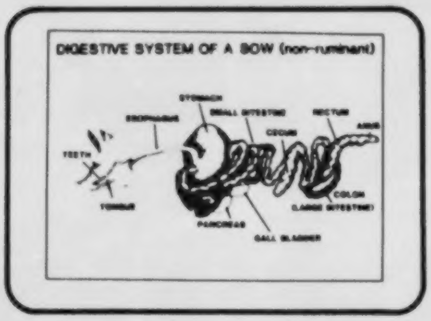
MONOGASTRIC (non-ruminant)	POLYGASTRIC (ruminant)
swine	beef cattle
horse	dairy cattle
poultry	sheep
human	goat

8. There are two types of digestive systems found in common farm animals. Swine, horses, and poultry are known as non-ruminants or monogastric animals because they have one stomach. Cattle, sheep, and goats are known as ruminants or polygastric animals because they have four sections to their stomach.

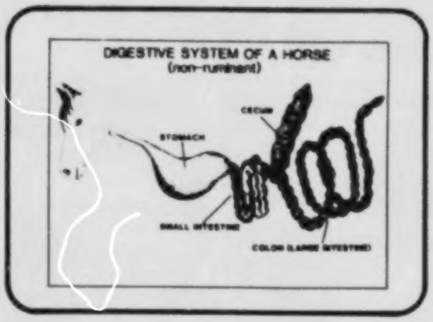

DIGESTIVE SYSTEM OF A COW (ruminant)*

*sheep and goats are similar

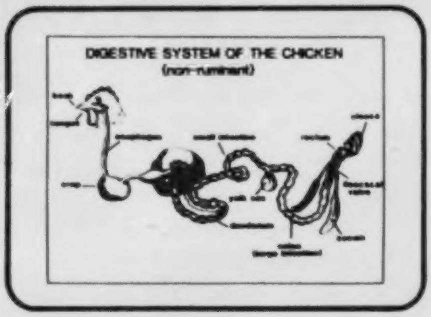
9. Note the four sections to the stomach (rumen, reticulum, omasum, abomasum). Also, the existence of a relatively small cecum.


DIGESTIVE SYSTEM OF A SOW (non-ruminant)

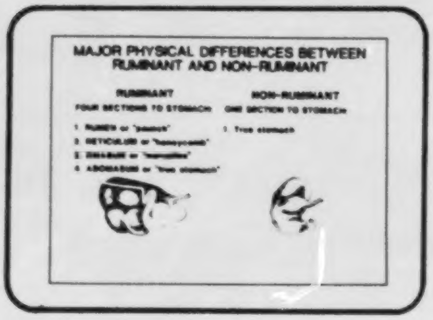
10. Note only one section to the stomach and the relatively small cecum.


DIGESTIVE SYSTEM OF A HORSE
(non-ruminant)

11. Note only one section to the stomach, but a large cecum. The cecum in the horse (also in the rabbit) has many functions similar to the rumen in ruminants. It allows horses to eat large quantities of forages.

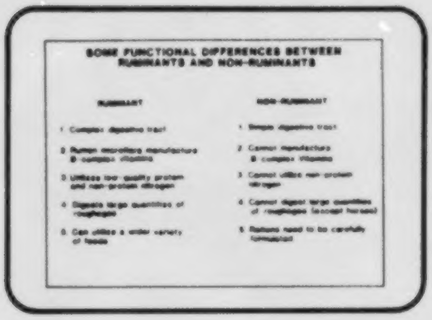

DIGESTIVE SYSTEM OF THE CHICKEN
(non-ruminant)

12. Note only one section to the stomach. Chickens have a crop where feed is stored and moistened. Feed eventually passes into the gizzard (not shown) where it is ground and crushed. It then passes into the small intestine for absorption.


MAJOR PHYSICAL DIFFERENCES BETWEEN
RUMINANT AND NON-RUMINANT

RUMINANT	NON-RUMINANT
FOUR SECTIONS TO STOMACH	ONE SECTION TO STOMACH
1. RUMEN or "paunch"	1. True stomach
2. RETICULUM or "honeycomb"	
3. OMASUM or "manyplies"	
4. ABOMASUM or "true stomach"	

13. The major physical difference beween the two digestive systems is the number of sections to the stomach.

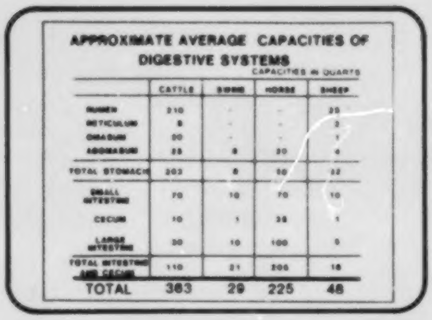


SOME FUNCTIONAL DIFFERENCES BETWEEN RUMINANTS AND NON-RUMINANTS

RUMINANT

NON-RUMINANT

14. Some of the major functional differences between the two digestive systems are noted. The rumen microflora and the ruminant live in a close symbiotic relationship with each other.

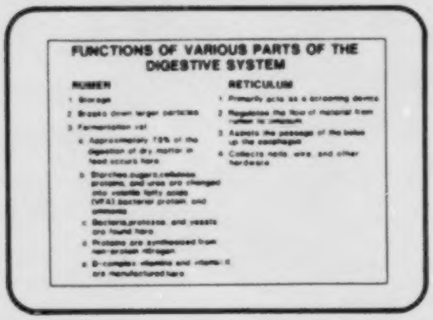


APPROXIMATE AVERAGE CAPACITIES OF DIGESTIVE SYSTEMS

CAPACITIES IN QUARTS

	CATTLE	SWINE	HORSE	SHEEP
RUMEN	210	-	-	25
RETICULUM	8	-	-	2
OMASUM	20	-	-	1
ABOMASUM	25	8	20	4
TOTAL STOMACH	263	8	20	32
SMALL INTESTINE	70	10	70	10
CECUM	10	1	35	1
LARGE INTESTINE	30	10	100	5
TOTAL INTESTINE AND CECUM	110	21	205	16
TOTAL	363	29	225	48

15. The approximate average capacities of the various sections of the digestive tracts of certain species are given. Note the large difference in total stomach capacity, cecum capacity and large intestine capacity between horses and cattle.

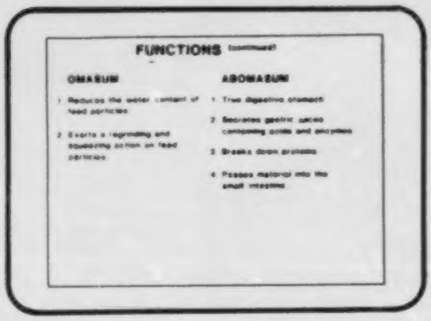


FUNCTIONS OF VARIOUS PARTS OF THE DIGESTIVE SYSTEM

RUMEN

RETICULUM

16. Functions of the rumen and reticulum are listed. The bolus is a small compact ball of feed.

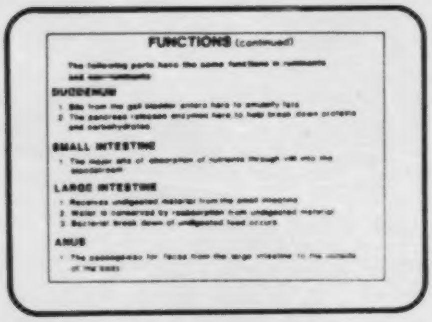


FUNCTIONS (continued)

OMASUM

ABOMASUM

17. Functions of the omasum and abomasum are listed.



FUNCTIONS (continued)

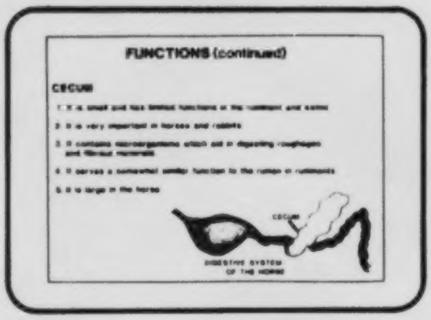
DUODENUM

SMALL INTESTINE

LARGE INTESTINE

ANUS

18. Functions of the duodenum, small intestine, large intestine, and anus are listed.

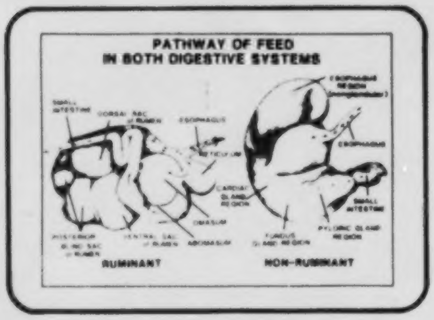

FUNCTIONS (continued)

CECUM

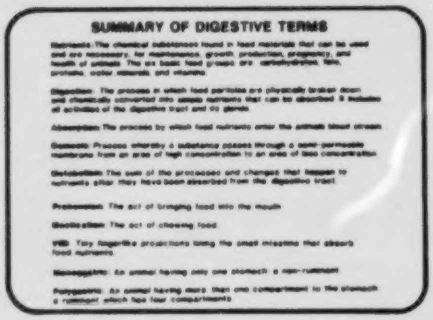
1. It is small and has limited functions in the ruminant and swine
2. It is very important in horses and rabbits
3. It contains microorganisms which aid in digesting roughages and fibrous materials
4. It serves a somewhat similar function to the rumen in ruminants
5. It is large in the horse

CECUM
DIGESTIVE SYSTEM OF THE HORSE

19. The cecum is located at the junction of the small and large intestine. It is often referred to as the "blind gut" or "blind sac."


PATHWAY OF FEED IN BOTH DIGESTIVE SYSTEMS

20. A comparison of the pathway of feeds as they enter the digestive system of a ruminant and non-ruminant.


SUMMARY OF DIGESTIVE TERMS

Nutrients: The chemical substances found in feed materials that can be used and are necessary, for maintenance, growth, production, pregnancy, and health of animals. The six basic feed groups are: carbohydrates, fats, proteins, water, minerals, and vitamins.

Digestion: The process in which feed particles are physically broken down and chemically converted into simple nutrients that can be absorbed. It includes all activities of the digestive tract and its glands.

Absorption: The process by which feed nutrients enter the animals blood stream.

Osmosis: Process whereby a substance passes through a semi-permeable membrane from an area of high concentration to an area of less concentration.

Metabolism: The sum of the processes and changes that happen to nutrients after they have been absorbed from the digestive tract.

Prehension: The act of bringing food into the mouth.

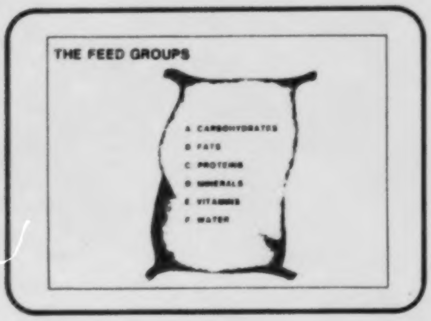
Mastication: The act of chewing food.

Villi: Tiny fingerlike projections lining the small intestine that absorb food nutrients.

Monogastric: An animal having only one stomach: a non-ruminant.

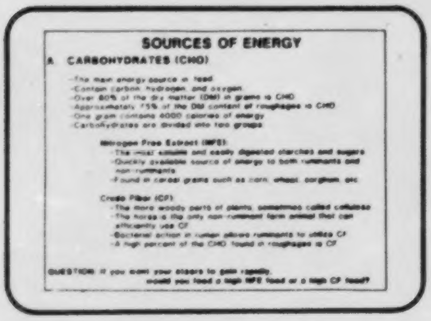
Polygastric: An animal having more than one compartment to the stomach: a ruminant which has four compartments.

21. Summary of digestive terms previously used.


THE FEED GROUPS

A. CARBOHYDRATES
B. FATS
C. PROTEINS
D. MINERALS
E. VITAMINS
F. WATER

22. There are six types of feed groups needed by animals for survival. These are: **carbohydrates, fats, proteins, minerals, vitamins, and water.**


SOURCES OF ENERGY

A. CARBOHYDRATES (CHO)

- The main energy source in feed
- Contain carbon, hydrogen, and oxygen
- Over 80% of the dry matter (DM) in grains is CHO
- Approximately 75% of the DM content of roughages is CHO
- One gram contains 4000 calories of energy
- Carbohydrates are divided into two groups

Nitrogen Free Extract (NFE)

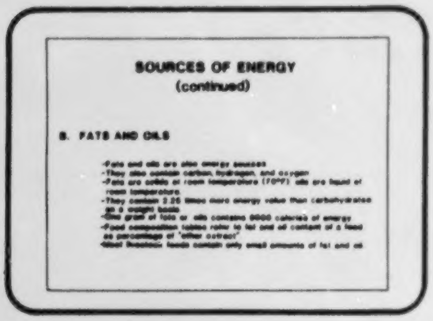
- The most soluble and easily digested starches and sugars
- Quickly available source of energy to both ruminants and non-ruminants
- Found in cereal grains such as corn, wheat, sorghum, etc.

Crude Fiber (CF)

- The more woody parts of plants, sometimes called cellulose
- The horse is the only non-ruminant farm animal that can efficiently use CF
- Bacterial action in rumen allows ruminants to utilize CF
- A high percent of the CHO found in roughages is CF

QUESTION: If you want your steers to gain rapidly, would you feed a high NFE feed or a high CF feed?

23. Energy is essential for an animal's body to function. Energy is necessary for walking, breathing, digestion, heart beating, etc. Carbohydrates are the main energy source found in animal feed. Grains are high in NFE; **roughages** are high in CF. Steers will gain more rapidly on a high NFE feed.

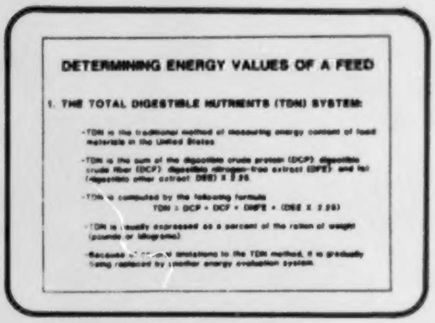


SOURCES OF ENERGY
(continued)

B. FATS AND OILS

-Fats and oils are also energy sources
-They also contain carbon, hydrogen, and oxygen
-Fats are solids at room temperature (70°F); oils are liquid at room temperature
-They contain 2.25 times more energy value than carbohydrates on a weight basis
-One gram of fats or oils contains 9000 calories of energy
-Food composition tables refer to fat and oil content of a feed as percentage of "ether extract"
-Most livestock feeds contain only small amounts of fat and oil

24. Fats and oils are also energy sources. They contain about 2.25 times more energy than carbohydrates.



DETERMINING ENERGY VALUES OF A FEED

1. THE TOTAL DIGESTIBLE NUTRIENTS (TDN) SYSTEM:

-TDN is the traditional method of measuring energy content of feed materials in the United States

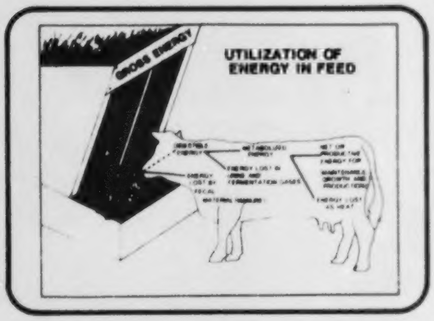
-TDN is the sum of the digestible crude protein (DCP), digestible crude fiber (DCF), digestible nitrogen-free extract (DNFE) and fat (digestible ether extract DEE) X 2.25

-TDN is computed by the following formula
TDN = DCP + DCF + DNFE + (DEE X 2.25)

-TDN is usually expressed as a percent of the ration of weight (pounds or kilograms)

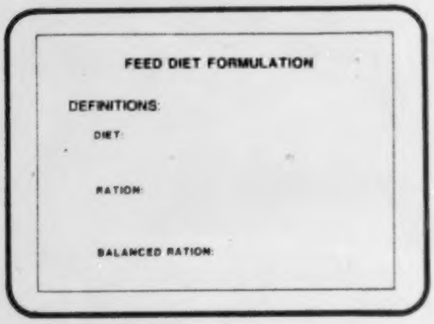
-Because of several limitations in the TDN method, it is gradually being replaced by another energy evaluation system.

25. The "Total Digestible Nutrients" system of determining energy values of a feed has traditionally been the most commonly used method.


GROSS ENERGY
DIGESTIBLE ENERGY
METABOLIZABLE ENERGY
NET OR PRODUCTIVE ENERGY FOR
ENERGY LOST IN URINE AND FERMENTATION GASES
MAINTENANCE, GROWTH AND PRODUCTION
ENERGY LOST BY FECAL MATERIAL (MANURE)
ENERGY LOST AS HEAT

UTILIZATION OF ENERGY IN FEED

26. The calorie system classifies the energy values of a feed into **gross** energy, **digestible** energy, **metabolizable** energy, and **net** energy. Each classification was defined on transparency 26.



FEED DIET FORMULATION

DEFINITIONS:

DIET:

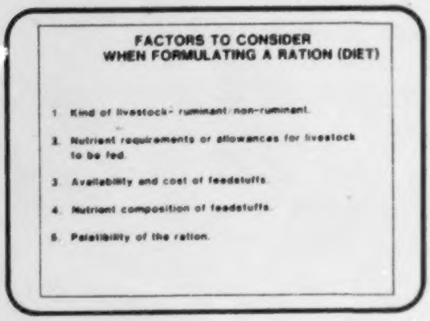
RATION:

BALANCED RATION:

27. **Diet**: The feed ingredient or mixture of ingredients, including water which is consumed by the animal.

Ration: The amount of feed supplied to an animal in a 24 hour period.

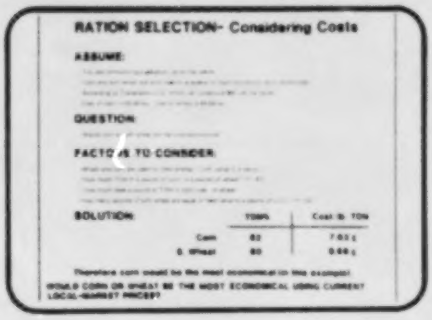
Balanced Ration: A ration that provides an animal the proper amounts and proportions of all required nutrients for a 24 hour period.



FACTORS TO CONSIDER
WHEN FORMULATING A RATION (DIET)

1. Kind of livestock- ruminant/non-ruminant.
2. Nutrient requirements or allowances for livestock to be fed.
3. Availability and cost of feedstuffs.
4. Nutrient composition of feedstuffs.
5. Palatibility of the ration.

28. Many factors should be considered when formulating a livestock feed diet. The kind of livestock, whether ruminant or non-ruminant is very important. A ruminant diet can utilize large amounts of roughages. The nutrient requirements or allowances for the species being fed, as well as the nutrient composition of feedstuffs, should be considered. Other factors affecting a ration are the availability and cost of various feedstuffs and the palatibility of the feedstuffs. Palatibility refers to how agreeable or attractive a feed is to an animal's taste.



RATION SELECTION- Considering Costs

ASSUME:

QUESTION:

FACTORS TO CONSIDER:

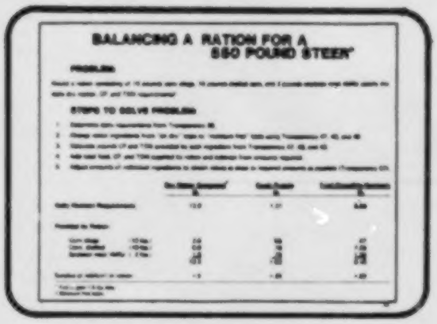
SOLUTION:

	TDN%	Cost lb. TDN
Corn	82	7.63¢
S. Wheat	80	9.69¢

Therefore corn would be the most economical in this example!

WOULD CORN OR WHEAT BE THE MOST ECONOMICAL USING CURRENT LOCAL-MARKET PRICES?

29. Grains are fed to swine because of their high energy value. The TDN value of grain is commonly used as the energy value of a grain. Transparency 47 indicates that the TDN value of corn for swine is 82% and the TDN value of wheat for swine is 80%. A bushel of shelled corn weighs 56 pounds and assume that it costs $3.50. The bushel of corn contains 45.9 pounds of TDN (56 x 82%). Therefore, $3.50 divided by 45.9 pounds equals a cost of 7.63 cents per pound of TDN in shelled corn. Wheat weighs 60 pounds per bushel and assume that it costs $4.65. It contains 48 pounds of TDN (60 x80%). Therefore, $4.65 divided by 48 pounds equals a cost of 9.69 cents per pound of TDN in wheat. Therefore, corn would be the most economical source of energy.



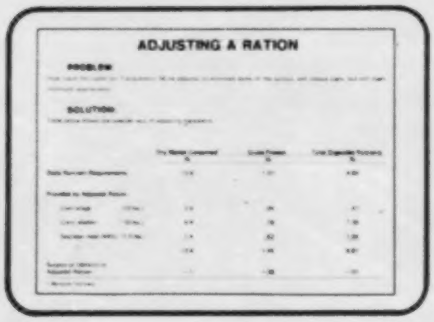
BALANCING A RATION FOR A 550 POUND STEER

PROBLEM

STEPS TO SOLVE PROBLEM

30. Will a daily ration consisting of 10 pounds **corn silage**, 10 pounds **shelled corn**, and 2 pounds **soybean meal (44%)** meet the daily dry matter, crude protein, and total digestible nutrient requirements of a 550 pound steer that is gaining 1.5 pounds per day? The first step in solving the problem is to determine the daily requirements of a 550 pound steer. Columns 3, 4, and 6 of line one on Transparency 38 provide this information. Note: These values are given on a "moisture free" basis. Use Transparencies 47, 48, and 49 to determine DM, CP, and TDN for shelled corn, corn silage, and soybean meal. Note: These values are given on an "air dry" basis and must be changed to a "moisture free" basis. For example, 10 lbs. of shelled corn is 89% dry matter. Therefore, 10 lbs. x 89% equals 8.9 lbs. of dry matter consumed from 10 lbs. of air dry shelled corn. Shelled corn has a CP value of 8.8%. Therefore, 8.9 lbs. x 8.8% equals .78 lbs. of CP consumed from eating 10 lbs. of air dry shelled corn. Shelled corn has a TDN value of 82% for cattle. Therefore, 8.9 lbs. x 82% equals 7.30 lbs. of TDN consumed from eating 10 lbs. of air dry corn. Similar computations will give the respective values of corn silage and soybean meal. This ration would provide a surplus of DM, CP, and TDN. The ration should be adjusted downward to eliminate as much of the surplus as feasible.

The same procedures would be used to balance a ration for sheep and horses. Also a ration for cattle can be balanced in a similar manner using **net energy**.

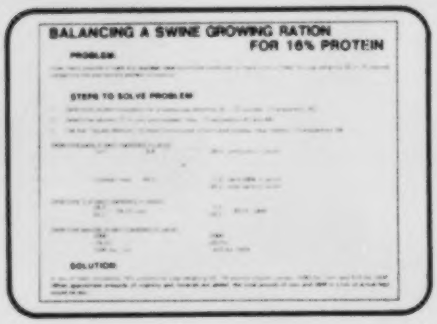


ADJUSTING A RATION

PROBLEM

SOLUTION

31. The efficient livestock producer prefers to meet the daily requirements without providing a large surplus. This helps reduce costs. Adjusting the ration by reducing the soybean meal content from 2 lbs. down to 1.5 lbs. would help reduce the surplus.



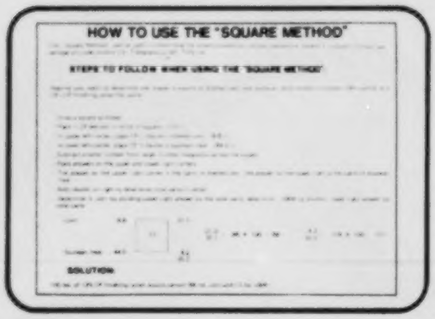
BALANCING A SWINE GROWING RATION FOR 16% PROTEIN

PROBLEM

STEPS TO SOLVE PROBLEM

SOLUTION

32. The "Square Method" is the easiest way to determine the proper amounts of a concentrate and a supplement that should be combined to produce a feed with a given percentage of crude protein. Young pigs weighing 35 to 75 lbs. need a 16% CP feed. Corn contains 8.8% CP and SBM contains 44% CP. Combining 1590 pounds of corn and 410 pounds of SBM will result in a 16% CP ration.

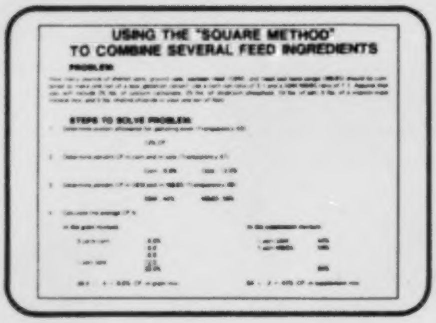


HOW TO USE THE "SQUARE METHOD"

STEPS TO FOLLOW WHEN USING THE "SQUARE METHOD"

SOLUTION

33. Following the steps shown for using the "Square Method" indicates that 88 percent of the ration should be corn and 12 percent should be SBM. Therefore, 100 pounds of feed would contain 88 pounds (100 lbs. x 88%) of corn and 12 pounds (100 lbs. x 12%) of SBM.

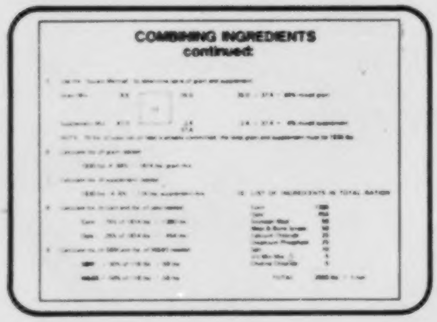


USING THE "SQUARE METHOD" TO COMBINE SEVERAL FEED INGREDIENTS

PROBLEM

STEPS TO SOLVE PROBLEM

34. The "Square Method" may be used to determine the amounts of several ingredients that should be combined to obtain a final ration containing a specified CP percentage.



COMBINING INGREDIENTS continued

35. Remember that 70 pounds of the 2000 pounds in a ton of feed are already committed to other ingredients. Consequently, the grain and supplement combined can total only 1930 pounds.

TEACHER'S KEY

SAMPLE TEST QUESTIONS ON GENERAL FACTS ON LIVESTOCK FEEDING

TRUE (+) – FALSE (0)

___+___ 1. A nutrient is a chemical that aids in the support of life.

___0___ 2. Carbohydrates provide a major source of proteins.

___0___ 3. Only 25% of the dry weight of most grains and roughages is made up of carbohydrates.

___+___ 4. Proteins are compounds made up of amino acids.

___0___ 5. There is 2¼ times as much energy in carbohydrates as in fats.

___+___ 6. Minerals can be found in teeth, bones, and the body's enzyme systems.

___0___ 7. B_{12} is a mineral.

___+___ 8. Water is very important in the body, functioning as an excellent solvent.

___+___ 9. Water is an often neglected nutrient.

___+___ 10. One of the first things a ration must do is maintain life by keeping the body at a constant weight and temperature.

MULTIPLE CHOICE – (Make appropriate choice of A, B, C, or D)

___D___ 1. Animals need nutrients for:

A. Growth
B. Maintenance
C. Finishing
D. All of the above

___A___ 2. A major nutrient:

A. Carbohydrates
B. Amino acids
C. Fatty acids
D. Both A and C

___A___ 3. Feeds high in the following are the least expensive in supplying the needs for finishing:

A. Carbohydrates and fats
B. Amino acids and proteins
C. Minerals
D. Vitamins and minerals, to provide the energy needed for the formation of fat

___C___ 4. A ration is the amount of feed allowed an animal during a:

A. 12 hr. period
B. Week's time
C. 24 hr. period
D. None of the above

MATCHING

F 1. nutrient
G 2. 10%
J 3. 50%
A 4. Minerals
H 5. Vitamins
I 6. Water
B 7. Carbohydrates
C 8. Fats
E 9. Proteins
D 10. Ration

A. Constituents of bones, teeth, and organs
B. Major source of energy
C. Glycerol
D. The amount of feed allowed an animal in 24 hrs
E. Amino acids
F. A chemical element or compound that aids in the support of life.
G. % crude protein of corn
H. B_2, B_{12}
I. Often neglected nutrient
J. % crude protein of soybean meal

COMPLETION (Write appropriate information or words to complete statements.)

1. Compounds made of amino acids are proteins .

2. Esters of fatty acids and glycerol are fats .

3. The six nutrients are carbohydrates , proteins , fats , minerals , vitamins , water .

4. Animals need nutrients for 5 basic functions. They are maintenance , growth , finishing , production , reproduction .

5. The amount of feed allowed an animal during a 24 hr. day is a ration .

6. A chemical element or compound that aids in the support of life is a nutrient .

7. Carbohydrates provide the animal with its major source of energy.

8. A feed that is high in fiber and low in digestible energy is a roughage .

9. Water is important in the body, functioning as a regulator of body temperature and a transporting medium for waste products.

10. A ration must maintain life by keeping the body at a constant weight and temperature.

ESSAY QUESTIONS

1. What are the characteristics of a good ration? Briefly discuss each characteristic.

(See page 2 of VAS Unit 1013a)

D 5. For growth, animals need:

A. Proteins
B. Minerals
C. Vitamins
D. All of the above

D 6. The amount of crude protein in corn is approximately:

A. 50%
B. 15%
C. 20%
D. None of the above

A 7. The amount of crude protein in soybean meal is approximately:

A. 50%
B. 15%
C. 20%
D. None of the above

C 8. For maintenance of beef cattle feed approximately:

A. 3 lbs. of air-dry roughage per 100 lbs. of live weight
B. 4 lbs. of air-dry roughage per 100 lbs. of live weight
C. 2 lbs. of air-dry roughage per 100 lbs. of live weight
D. None of the above

C 9. A rule of thumb for feeding dairy cattle is to provide them:

A. 3 lbs. of air-dry roughage per 100 lbs. of live weight and a concentrate mixture based upon the quality of roughage supplied and quantity of milk produced
B. 4 lbs. of air-dry roughage per 100 lbs. of live weight and a concentrate mixture based upon the quality of roughage supplied and quantity of milk produced
C. 2 lbs. of air-dry roughage per 100 lbs. of live weight and a concentrate mixture based upon the quality of roughage supplied and quantity of milk produced
D. None of the above.

B 10. For dairy cattle, the percentages of protein in the concentrate mixture can range from:

A. 20 to 30, depending on the kind and quality of roughage
B. 10 to 18, depending on the kind and quality of roughage
C. 16 to 25, depending on the kind and quality of roughage
D. None of the above

2. Describe and illustrate how to use the Pearson Square to find the proportions of two feeds which when mixed together will furnish a desired percentage of protein.

(See pages 4, 5, and 6 of VAS Unit 1013a)

UNIT E: Crop Science

PROBLEM AREAS:

1. Identifying crop and weed seeds
2. Judging quality of grain for seed and for market
3. Growing corn
4. Growing soybeans

CROP SCIENCE

UNIT E: CROP SCIENCE

PROBLEM AREA: IDENTIFYING CROP AND WEED SEEDS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is in the early fall or prior to the Crops Contest. The estimated time for teaching this problem area is 2 to 5 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. Students need instruction on methods used to correctly identify crops seeds and weed seeds which are associated with student's S.O.E.P.
2. It is important for students to be able to identify the common crop seeds and weed seeds in their local community and Illinois.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-21-D-0542-388 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide, and student job sheets were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and transparency discussion guide were adapted by Vocational Agriculture Service, University of Illinois, from materials prepared by State Coordinating Council for Occupational Education, Olympia, Washington.

The sample test questions were developed by Larry Shimmin, Vocational Agriculture Instructor, Sherrard, Illinois. The information sheet, "Illinois Seed Law," was reprinted from Illinois Seed Law, Rules and Regulations, 1975. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Crop science

II. Problem area: Identifying crop and weed seeds

III. Objectives: At the close of this problem area the students will be able to:

1. Identify the common weed seeds discussed in class by visual inspection of a slide or seed sample.
2. Classify the common weed seeds as common, semi-noxious, or primary noxious in Illinois.
3. Identify the cropping system where the weeds would be found.
4. Identify by visual inspection, the common crop seeds as discussed in class using slides or seed samples.

IV. Suggested interest approaches:

1. Identify the students who have crops for their S.O.E.P's. Ask the following lead questions: "How many have received a 'dock' in price for foreign matter when you sold your crops?" "What was the foreign matter?" "Could you identify the weed seed?" "What is the relationship between properly identifying the weed seed and selecting a herbicide for next spring's crop?"

   Continue discussion until students indicate they know the importance of weed seed identification.

2. Display samples of grain with weed seed and samples that are clean and have students select the samples they would buy. Ask them to give reasons for their choices.
3. Take a field trip to an elevator or home farm where grain is being unloaded. Obtain some samples and inspect them for weed seed. Have the owner or manager discuss the problems of weed seed in harvested crops.
4. Obtain samples of crop seeds from students' S.O.E. projects, have the class identify them. Present other crop seeds which are important to Illinois' agriculture and determine how many of the total samples the class can identify.

V. Anticipated problems and concerns of students:

1. Where are the common weeds found in Illinois?
2. How can I identify weed seeds?
3. What is a noxious weed seed?
4. What is a primary noxious and semi-noxious weed seed?
5. Why is it important to be able to identify weed seeds?
6. What crops are important in Illinois' agriculture?
7. How can I identify crop seeds?

VI. Suggested learning activities and experiences:

1. Take samples of grain obtained from students' S.O.E. project or the elevator and have students separate the crop seeds and weed seeds. Discuss and identify those found.

2. Show and discuss VAS Slidefilm 793, "Identification of Weed Seeds." Restrict discussion to those important in the community.

3. Display crop seed samples and have students identify as many as possible. Use small groups to identify the remaining seeds and report back to the entire class when they have identified all their samples.

4. Identify and solve the students' anticipated problems and concerns. Conduct supervised study to locate solutions to the questions.

5. Distribute Job Sheets 1 and 2. Have students locate weed seeds and crop seeds. Bring them to class and tape them to the sheets. Complete the job sheets in class. Use the information sheet on Illinois Seed Law to identify noxious weed seeds.

6. Use the transparencies and discussion guide to present information related to this problem area.

VII. Suggestions for using this problem area:

1. The students should be able to idenitfy important crop and weed seeds found in the community or Illinois.

2. The students should be able to identify any seed, by use of references, and seed found in their S.O.E.P.

3. The students should be able to identify weeds as harmful, semi-harmful or noxious.

VIII. Evaluation:

1. Collect and evaluate Job Sheets 1 and 2.

2. Have students identify crop and weed seeds via judging scorecards.

3. Administer test.

IX. References and aids:

1. Crops seed samples, Vocational Agriculture Service, University of Illinois, Urbana, IL.

2. VAS Slidefilm 793, Identification of Weed Seeds, Vocational Agriculture Service, University of Illinois, Urbana, IL.

3. Weeds of the North Central States, Circular 718, Agriculture Experiment Station, University of Illinois, Urbana, IL.

4. Information sheet, Illinois Seed Law, Department of Agriculture, Bureau of Products Inspection and Standards, Emmerson Building, Fairgrounds, Springfield, IL 62706.

5. Job Sheets 1 and 2.

6. Sample Test Questions.

INFORMATION SHEET

ILLINOIS SEED LAW LISTING

Prohibited (Primary) Noxious Weed Seeds in Illinois

Definition: Seeds of weeds which when established are highly destructive, competitive and/or difficult to control by cultural or chemical practices.

1. Bindweed, field
2. Cress, hoary
3. Johnson grass
4. Knapweed, Russian
5. Sorghum Alum
6. Sowthistle, perennial
7. Spurge, leafy
8. Thistle, Canada

Restricted (Secondary) Noxious Weed Seeds in Illinois

Definition: Seeds of weeds which are objectionable in fields, lawns and gardens of this State, but which can be controlled by cultural or chemical practices.

1. Buckhorn
2. Bullnettle
3. Carrot, wild
4. Daisey, oxeye
5. Dock, curled
6. Dodders
7. Garlic, wild
8. Giant foxtail
9. Mustards
10. Onion, wild
11. Rape, bird
12. Quackgrass

Other Weed Seeds Commonly Found in Illinois

1. Cheat
2. Foxtail, yellow
3. Jimson
4. Lambs quarter
5. Morning glory
6. Pepper grass
7. Pigweed
8. Ragweed, common and giant
9. Smartweed
10. Velvetweed
11. Wild buckwheat

STUDENT JOB SHEET 1

IDENTIFICATION OF WEED SEEDS

Seed Sample (Tape or Glue)	Physical Characteristics of Seed and Plant (i.e. size, shape, color, etc.)	Primary Noxious; Secondary Noxious; or Semi-harmful; or Common Weed	Location Commonly Found (Field crop, pasture, etc.)

STUDENT JOB SHEET 2

IDENTIFICATION OF CROP SEEDS

Seed Sample (Tape or Glue)	Characteristic of Seed and Plant	Monocot or Dicot Seed	Legume, Cereal or Oil Grain

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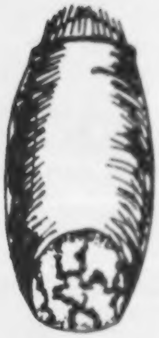
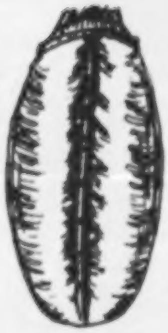
SOFT RED WINTER WHEAT



BRUSH MIDLONG
DEFINATE RING

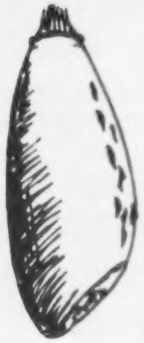
LARGE
GERM



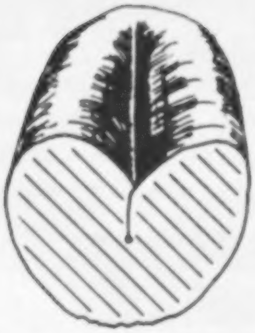
BARREL
SHAPED
KERNEL

OPEN
CREASE

WIDEST
AT
MIDDLE

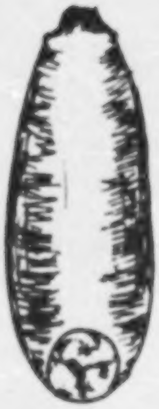


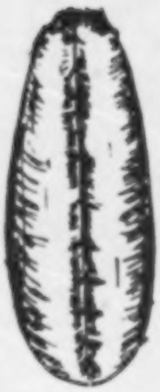
ROUND, SOMETIMES
WRINKLED BACK

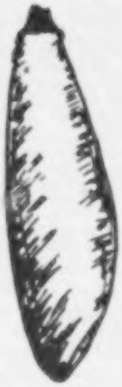


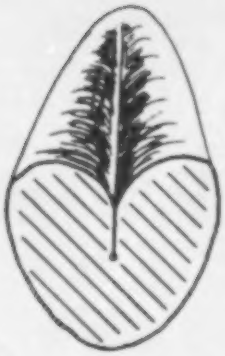
ROUNDED
CHEEKS

HARD RED WINTER WHEAT

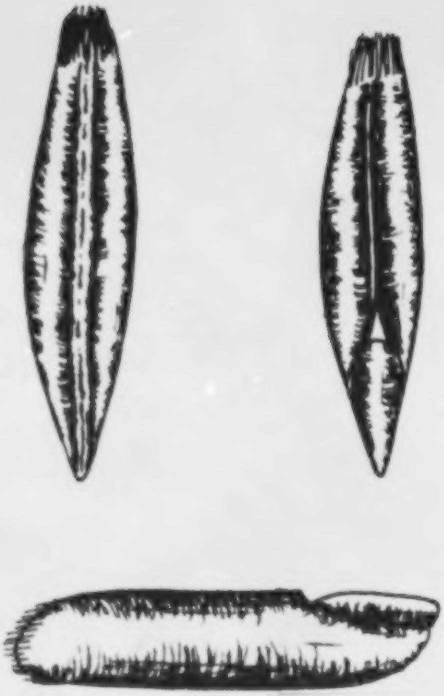


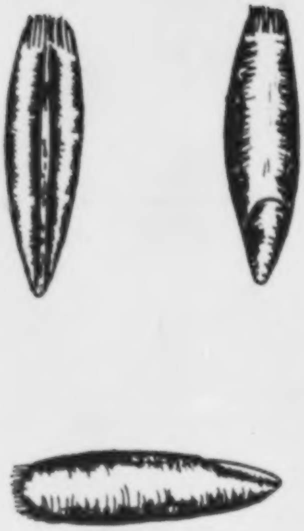






RYE





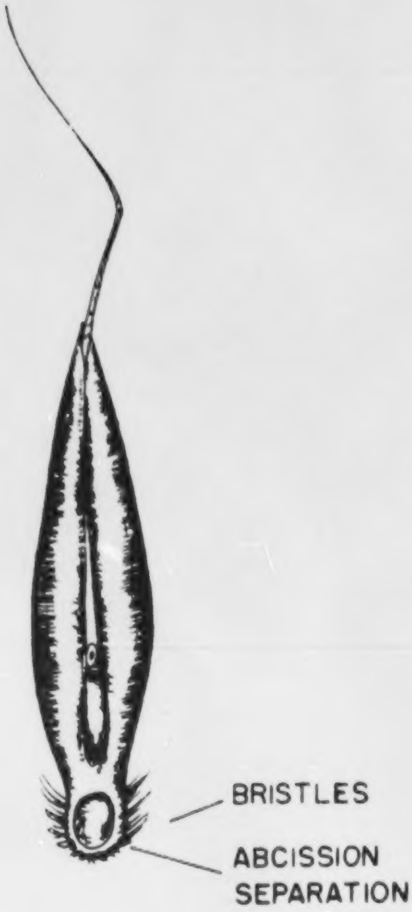
TETRA PETCUS

DEEP, OPEN CREASE
LARGE, POINTED GERM
RIDGE ON BACK
SHORT BRUSH

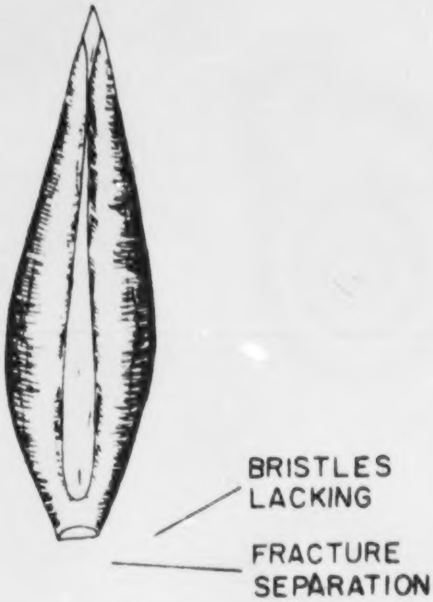
BALBOA

SHALLOW, TIGHT CREASE
LARGE, POINTED GERM
SMOOTH BACK
SHORT BRUSH

OAT SEED

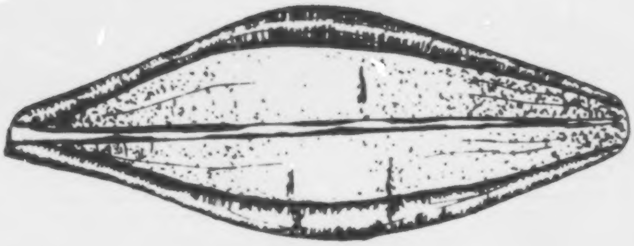


TYPICAL
WILD OAT



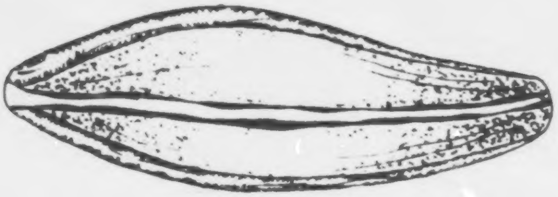
TYPICAL
CULTIVATED OAT

BARLEY



2-ROW

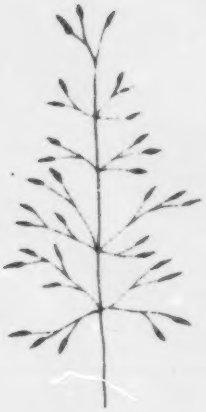
ALL KERNELS ARE STRAIGHT



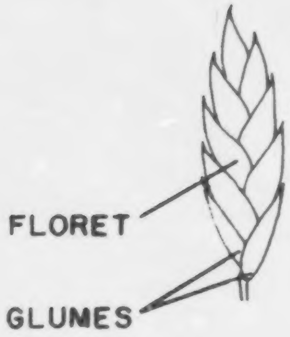
6-ROW

2/3 OF THE KERNELS ARE
BENT DUE TO CROWDING
AT RACHIS JOINT

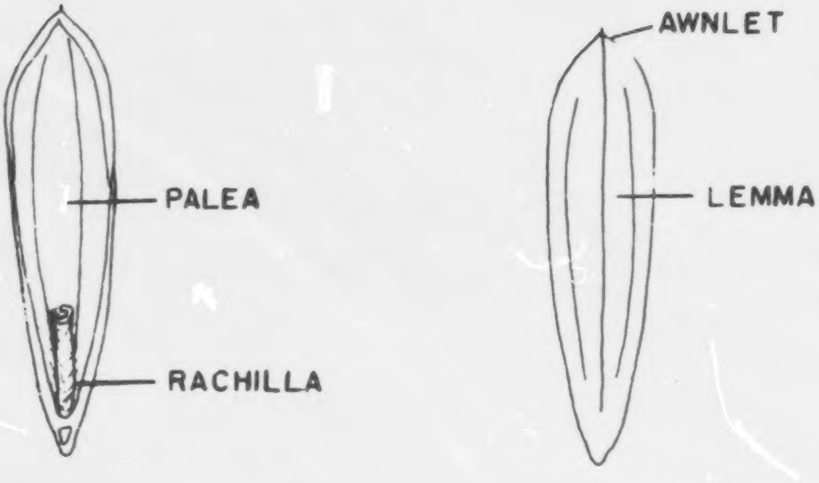
SMOOTH BROMEGRASS



INFLORESCENCE

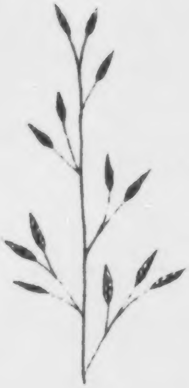


SPIKELET



SEED

TALL FESCUE



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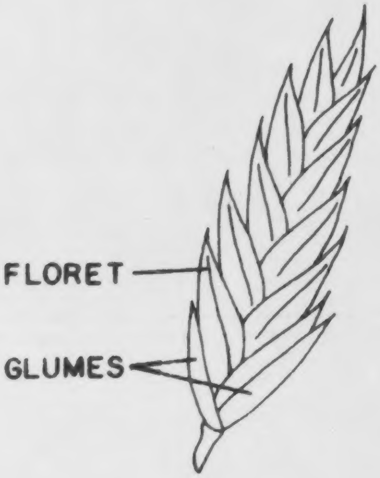
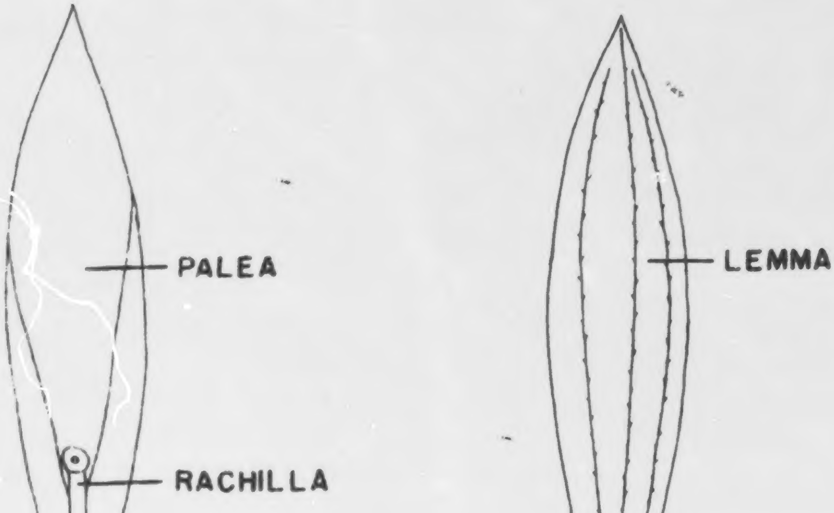
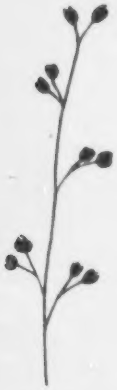


SPIKELET



SEED

ORCHARDGRASS



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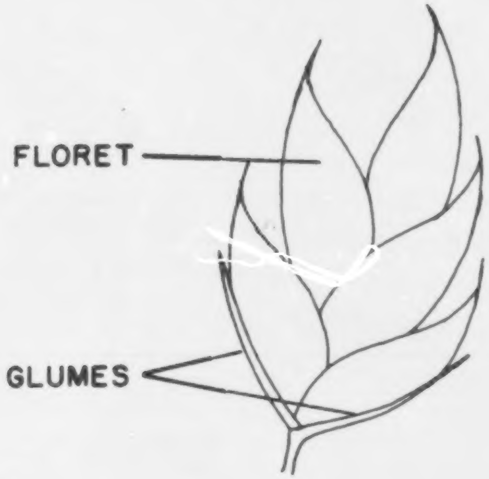
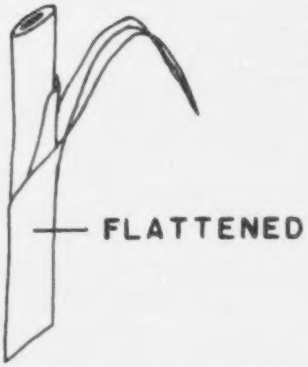
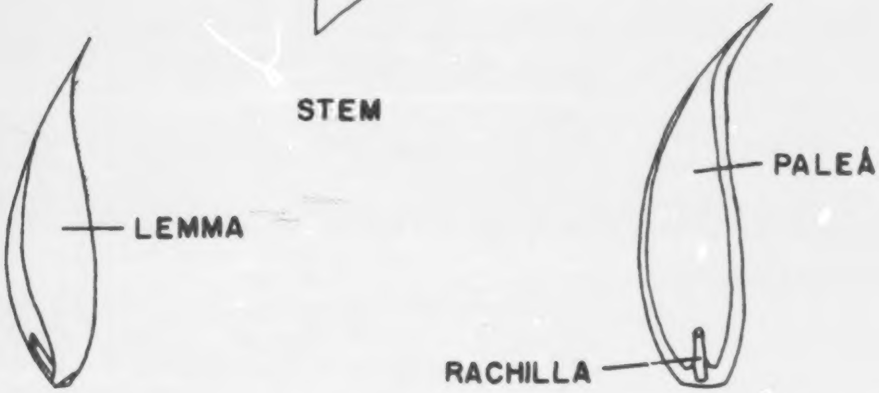


SPIKELET

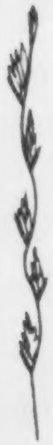


STEM

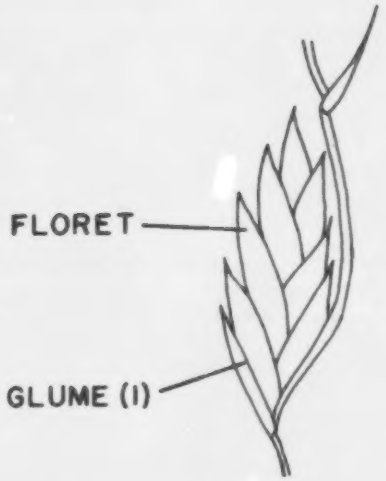


SEED

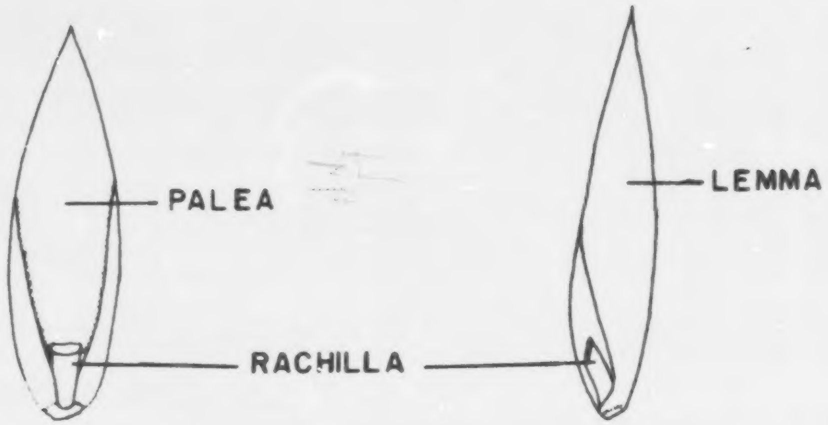
PERENNIAL RYEGRASS



INFLORESCENCE

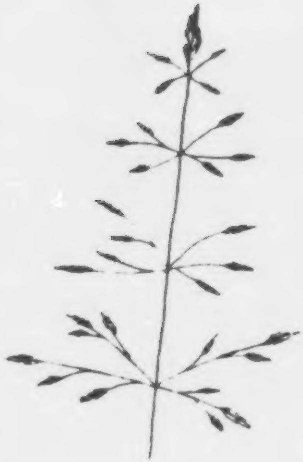


SPIKELET



SEED

RED TOP



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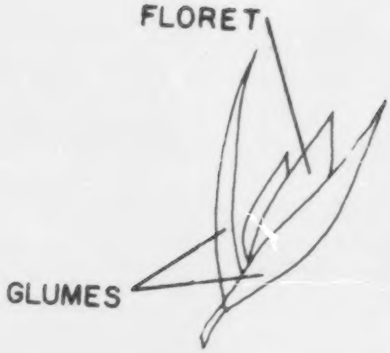

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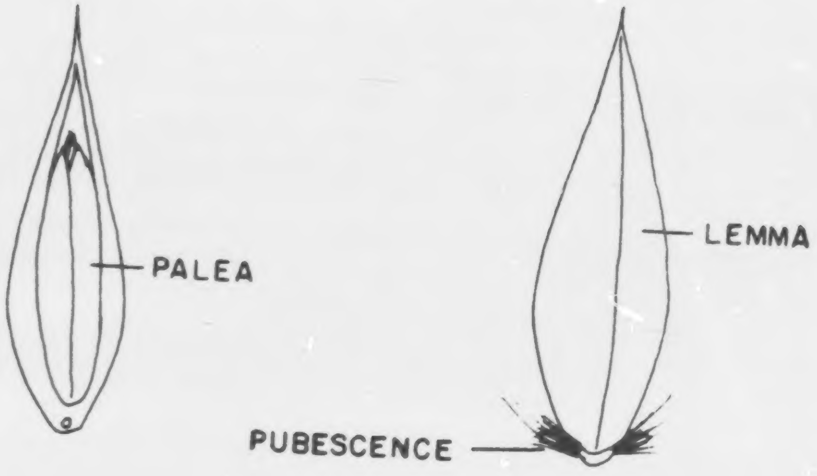
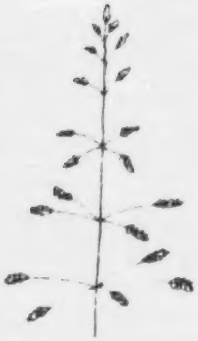
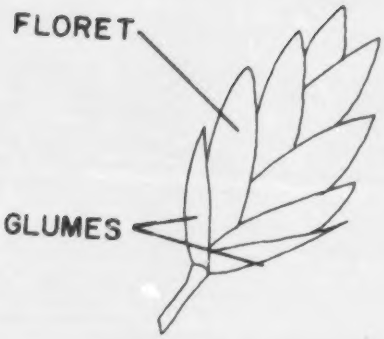


SEED

KENTUCKY BLUEGRASS



INFLORESCENCE



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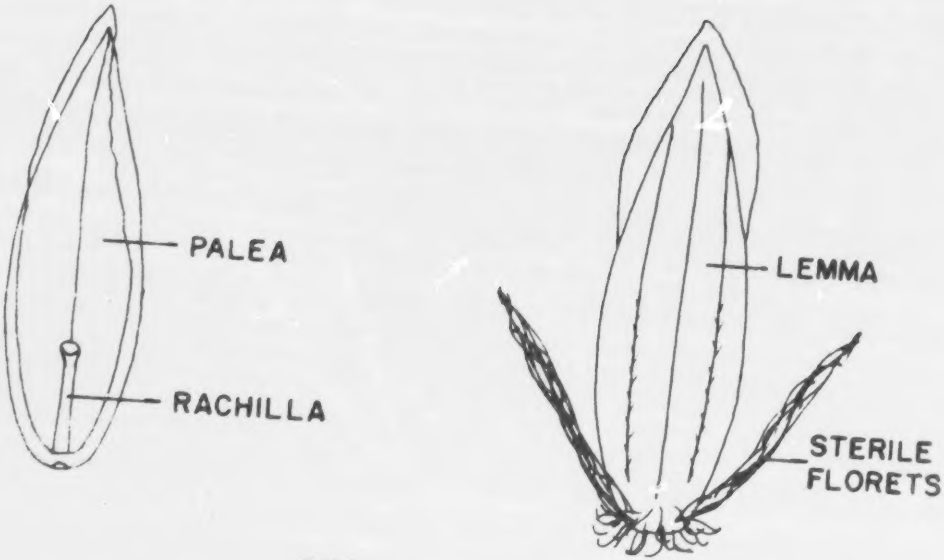
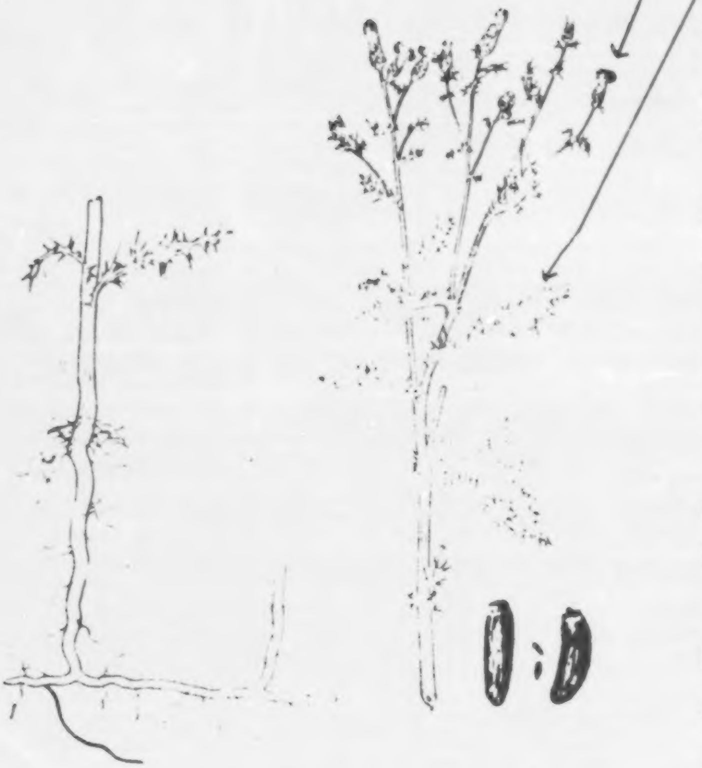


SEED

CANADA THISTLE

(Cirsium arvense (L.) Scop)
Cursed thistle, Devil's thistle



Rose-purple flowers

Leaves irregular, deeply cut relatively smooth to spiny margins

Both male and female flowers

Plant erect branching near the top

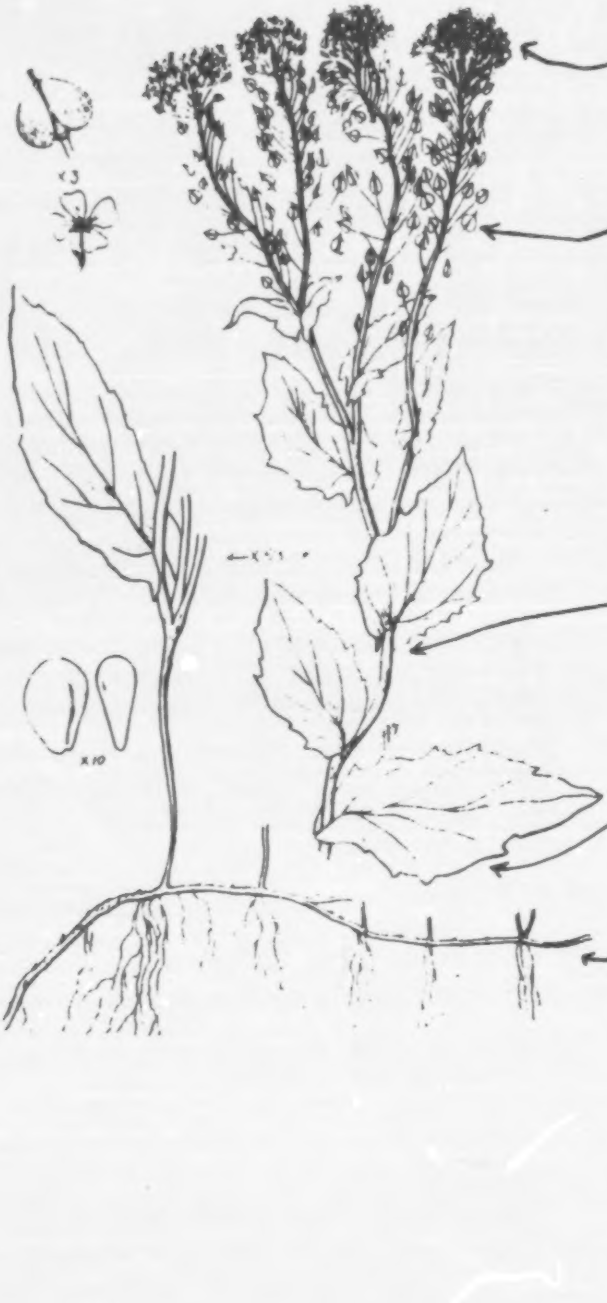
Grows 2 to 7 feet high

Reproduces by seed and by underground rootstocks

Perennial

WHITE TOP

(Cardaria draba)
Hoarycress, Perennial peppergrass



Creamy-white flowers

Seed pods flattened and heart-shaped

Upper stem branches profusely

Upper leaves clasp the stems

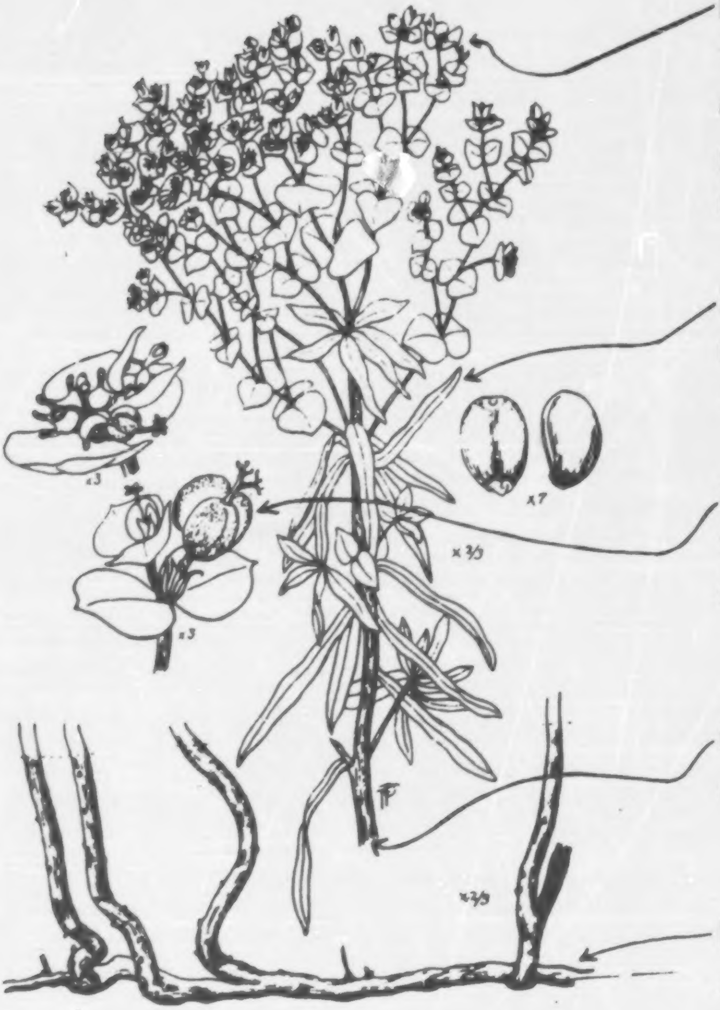
Leaves greyish-green

Reproduces by seed and rootstocks

Perennial

LEAFY SPURGE

(Euphorbia esula (L.) Hill)



Entire top portion of plant may appear yellowish green at this stage

Leaves, alternate, narrow and lace-like

Seeds borne in a three-lobed capsule

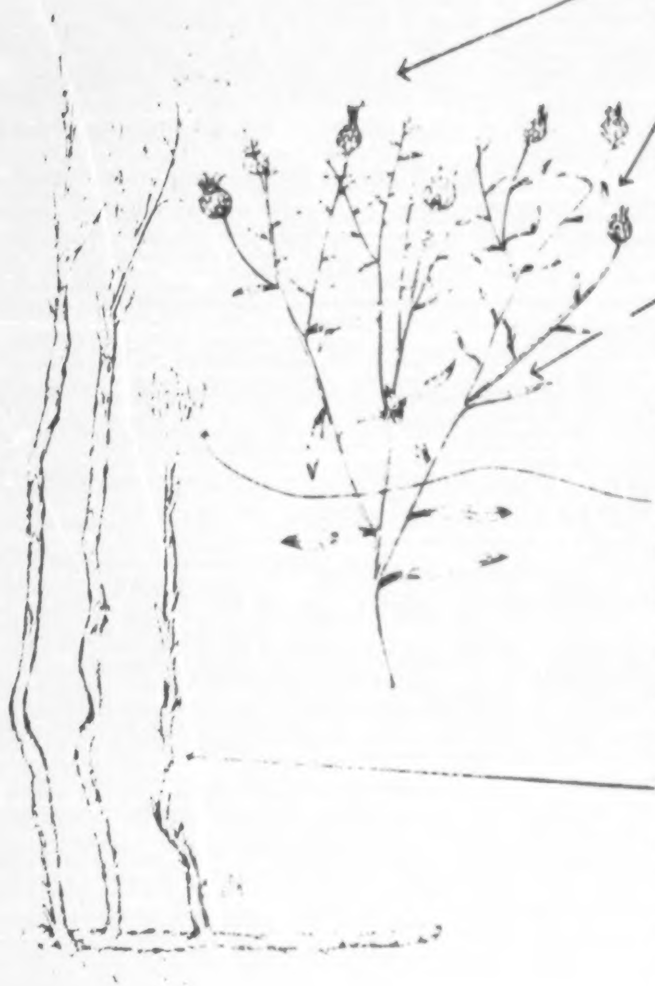
Entire plant has a milky juice

Reproduces by seed and underground rootstalks

Perennial

RUSSIAN KNAPWEED

(Centaurea repens Pall.)



Light purple flowers

Seed heads scaly and do not open up at maturity

Upper leaves simple, small and linear

Lower leaves larger and deep notched and covered with downy white hairs

Roots are usually dark brown or black

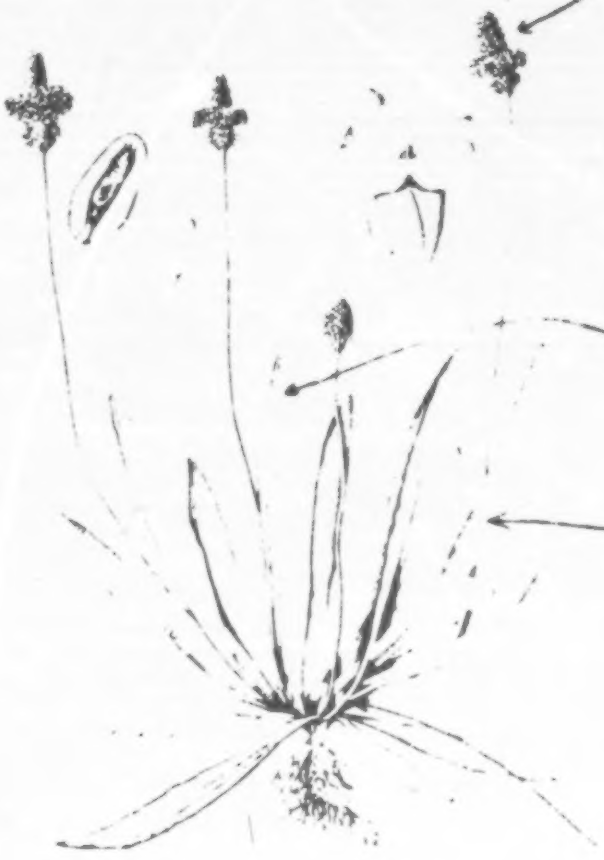
Entire plant has a lingering bitter taste

Reproduces by seeds and rootstocks

Perennial

BUCKHORN PLANTAIN

(Plantago lancelolata)
Buckhorn, Ribgrass



Resembles timothy head

Seed brown, canoe-shaped

3 to 5 prominent veins

Long, narrow lance-shaped leaves

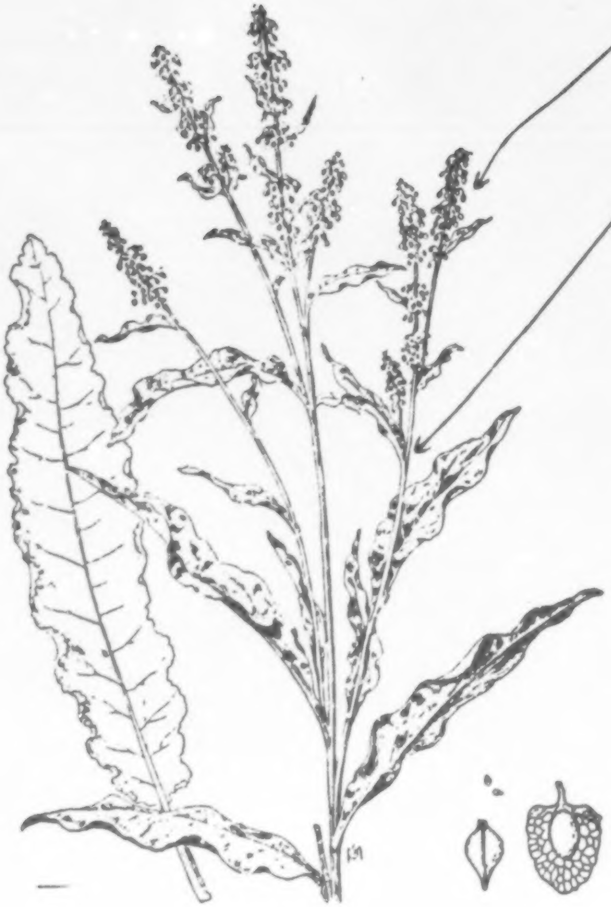
Basal leaves

A tuft of brown hairs are at the base of each leaf

Perennial

CURLY DOCK

(Rumex crispus L.)
Curled dock, Indian tabacco, Sour dock



Flowers form a triple winged pod

Reddish brown at maturity

Upper leaves clasping and less wavy than the lower leaves

Lower leaves 6 to 8 inches long and wavy

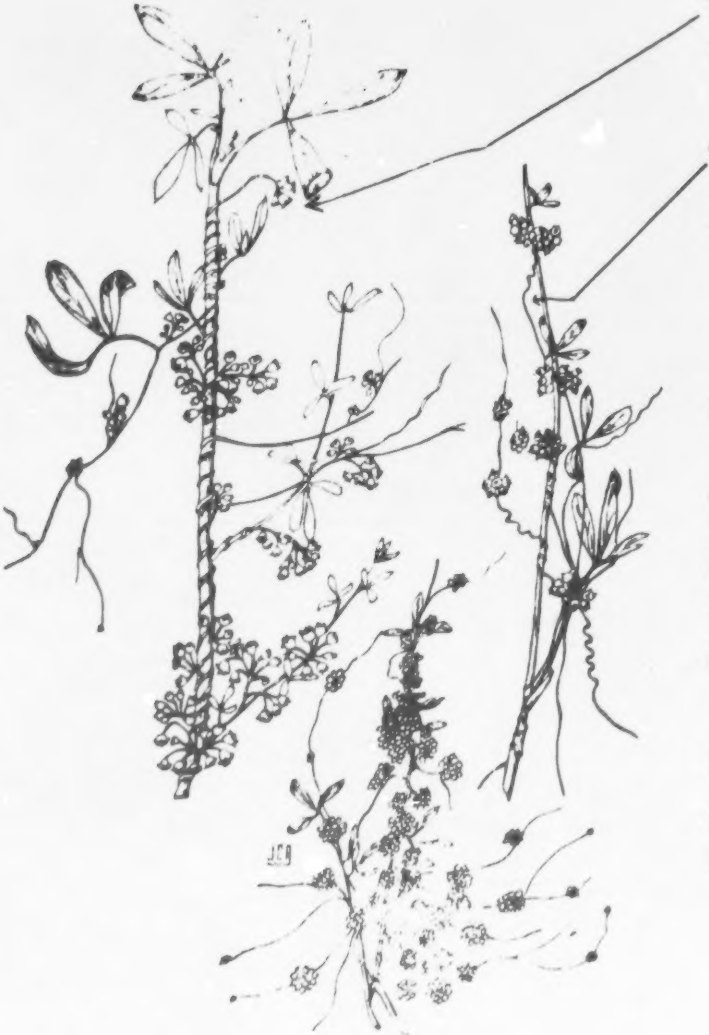
Reproduces by seed

Perennial having a deep taproot

DODDER

(Cuscuta sp.)

Devil's hair, Field dodder



Small whitish flowers

Stems hair-like yellow to reddish

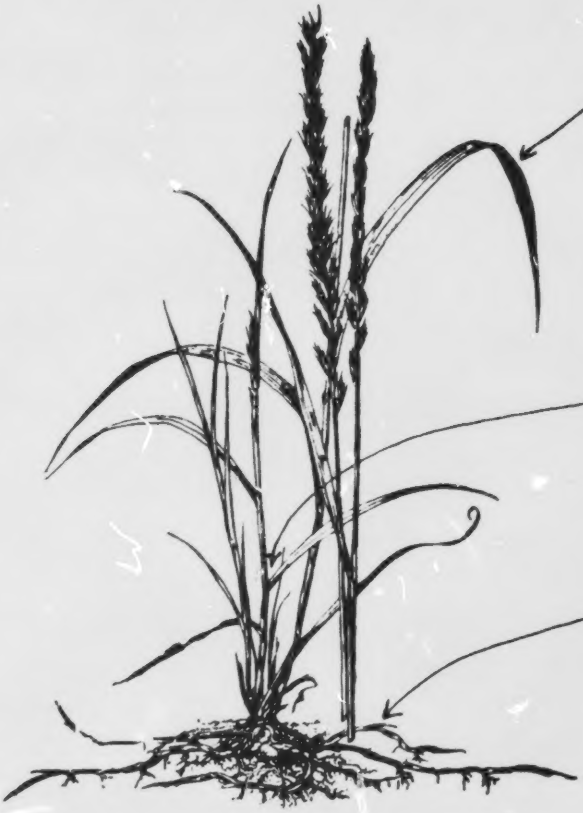
No leaves

Yellowish seed, remain viable five years or more

Plant is parasitic, ground stem soon breaks off

QUACKGRASS

(Agropyron repens (L.) Beauv.)
Couchgrass, Devil's grass



Inconspicuous flowers

Grows 1 to 4 feet tall

Leaves are somewhat rough

Lower leaf sheaths are somewhat hairy

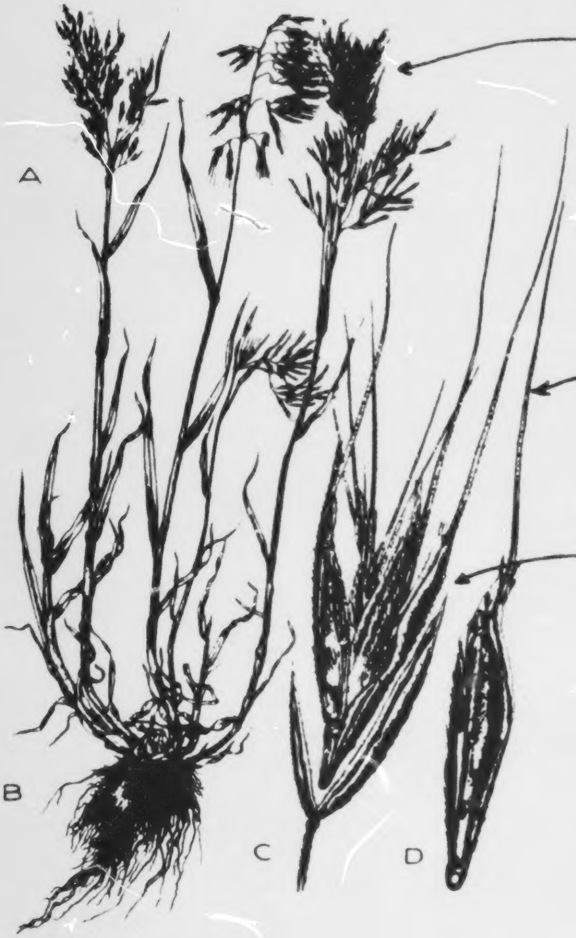
At base of each leaf a small pair of claws (auricles) clasp the stem

Forms dense mat of white to straw-colored rootstocks

Perennial

CHEATGRASS

(Bromus tectorum L.)



Head loose and nodding

Grows 6 to 24 inches tall

Seeds contain a long rough awn or beard

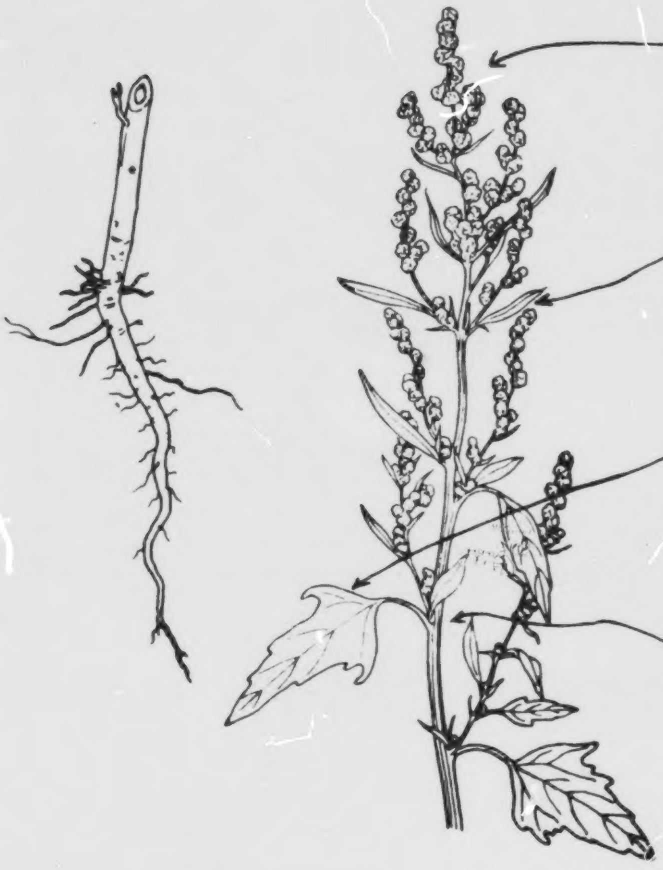
Turns reddish purple upon maturing

Leaves covered with soft hairs

Annual

LAMBS-QUARTERS

(Chenopodium album L.)
Pigweed



Flowers in clusters, green and inconspicuous

Leaves covered with white mealy substance

Leaves have irregular toothed margins

Stems smooth, often striped with pink or purple and are usually ridged and grooved

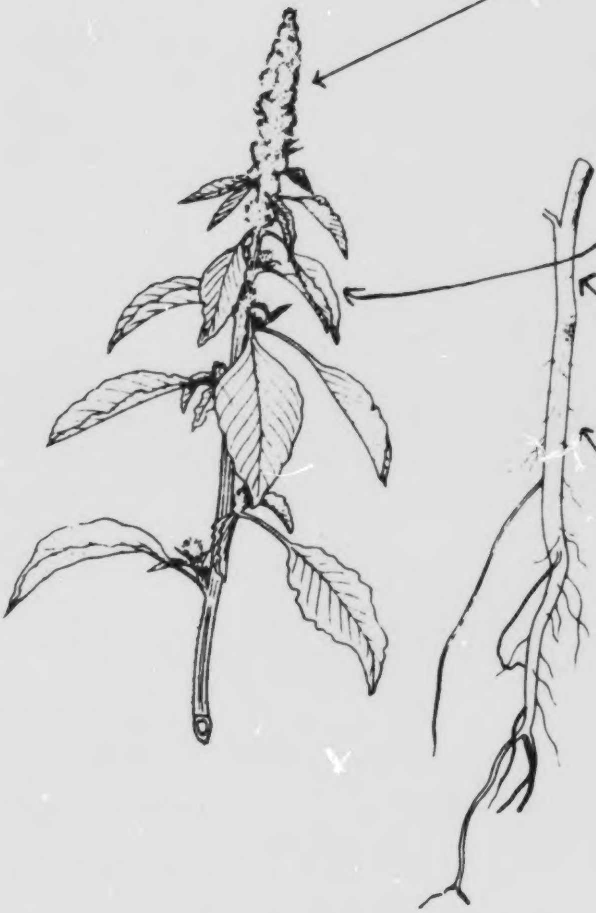
Plant grows from 1 to 6 feet high

Reproduces by seed

Annual

PIGWEED

(Amaranthus retroflexus L.)
Redroot



Dense prickly clusters of inconspicuous flowers

Leaves somewhat eggshaped, attached to stem with a long petiole

Rough somewhat hairy central stem

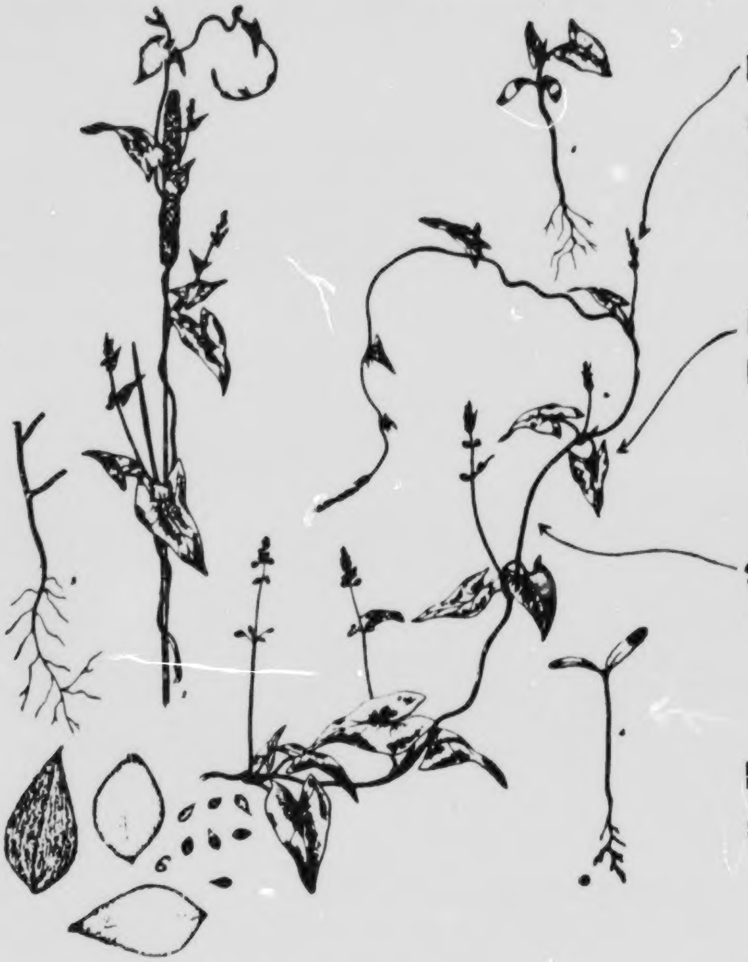
Reddish-pink root

Reproduces by seed

Annual

WILD BUCKWHEAT

(Polygonum convolvulus)
Black bindweed



Flower inconspicuous borne in clusters on flower stalks

Leaves arrow or heartshaped

Stems long, twining or trailing

Reproduces by seed

Annual

DISCUSSION GUIDE FOR TRANSPARENCIES

IDENTIFYING CROP AND WEED SEEDS

Transparency 1 and 2: **Market Classes of Wheat**

Wheat can be identified successfully as to market class by kernel shape and structure, and by brush, check, and crease types. These transparencies (1 and 2) illustrate seed characteristics common to two wheat market classes, soft red winter and hard red winter.

Transparency 3: **Rye**

The factors distinguishing rye from wheat are noted in this transparency. Rye is longer, more slender, tighter crease. Wheat is shorter and plumper.

Transparency 4: **Oat Seeds**

This transparency shows the main identifying characteristics between cultivated and wild oats with parts labeled.

Transparency 5: **Barley**

This transparency illustrates the major differences between 2-rowed and 6-rowed barley seed. This difference is difficult to recognize at first but it can be observed with practice.

GRASS IDENTIFICATION

These transparencies (6–11) show the inflorescence, spikelet, and a dorsal-ventral view of the caryopsis for several grass types. The most easily observed characteristics were drawn as outline sketches with much elimination of detail. The spikelet and seeds illustrated are enlarged to fully demonstrate several minute identifying features. Observation of living material should accompany these transparencies, to gain experience in recognizing the various points as they actually exist. Many of the following features are difficult to see and can be mastered only with considerable practice and observation.

Transparency 6: **Smooth Bromegrass**

Panicle is more open with spikelets long, narrow, and tight usually containing 3–6 seeds. The seed is very flat and papery, with a blunt tip, and with a small awn at the apex. The rachilla is large and pubescent.

Transparency 7: **Tall Fescue**

The inflorescence, a panicle, is larger than red fescue with tighter spikelets. The seed is boat shaped with a knobbed rachilla and with spines along the veins of the lemma.

Transparency 8: **Orchardgrass**

The spikelet is small, very dense, and develops in tight clusters within the panicle. The seed is curved with fine hairs along the mid vein of the lemma, terminating in a short curved awn. Rachilla is present, but not knobbed. Stems are much flattened, especially at the base.

Transparency 9: **Perennial Ryegrass**

The inflorescence is a spike, with spikelets arranged edgewise (in contrast to flatwise) to the rachis. The second glume is absent or compressed into the rachis leaving the appearance of only one glume per spikelet. The seed is boat shaped with a wedge-shaped rachilla and the inner margin of the palea is minutely toothed. Seed is similar to tall fescue in color and size except the rachilla is not knobbed.

Transparency 10: **Redtop**

The inflorescence is a definite pyramidal, open panicle which turns red with maturity. The glumes completely enclose the florets. The seed is small, narrow, pointed, and with no apparent rachilla. A tuft of fine hairs may be present at the base of the seed.

Transparency 11: **Kentucky Bluegrass**

Panicle is open with lower branches in whorls of five. The spikelet contains many florets and is much flattened, resulting in compressed seeds. Seeds have a thin hood projecting around the upper half of the seed, and webbing, representing sterile florets, may be present at the base.

WEED IDENTIFICATION

The following transparencies (12–23) show the identifying plant and seed characteristics of several weeds in diagrammatic form. These drawings are intended only to demonstrate the features of various weeds and should be supplemented by examination of living plant specimens to become competent in weed identification. Specific descriptions related to identification of each weed appears on each of the following transparencies of this series.

Examples of Primary Noxious Weed Seeds in Illinois

Transparency numbers:

12 – Canada Thistle
13 – White Top (Hoarycress)
14 – Leafy Spurge
15 -- Russian Knapweed

Examples of Secondary Noxious (Semi-Noxious) Weed Seeds in Illinois

Transparency numbers:

16 – Buckhorn Plantain
17 – Curly Dock
18 – Dodder
19 – Quackgrass

Examples of Weeds Commonly Found in Illinois

Transparency numbers:

20 – Cheatgrass
21 – Lambs Quarters
22 – Pigweed
23 – Wild Buckwheat

TEACHER'S KEY

SAMPLE TEST QUESTIONS

IDENTIFYING CROP AND WEED SEEDS

I. MATCHING

A 1. Corn
A 2. Peanuts
C 3. Alsike clover
B 4. Timothy
A 5. Barley
A 6. Sunflower
C 7. Red Clover
B 8. Fescue
A 9. Soybean
D 10. Johnson grass
B 11. Orchard grass
A 12. Wheat
D 13. Quackgrass
B 14. Red top
B 15. Sudan grass
A 16. Flax
D 17. Wild garlic
C 18. White clover
C 19. Vetch
D 20. Foxtail

A. Cereal grain and/or oil crop
B. Forage grass
C. Forage legume
D. Weed

II. Answer the following questions:

1. Identify the samples of seeds on display:

   a.

   b.

   c.

   d.

   e.

   f.

   g.

   h.

   i.

   j.

   k.

   l.

   m.

   n.

   o.

   p.

2. What are the two varieties of popcorn?

   a. white

   b. yellow

3. What is a hilum?

   Seed scar, point of seed attachment commonly noted on soybean seed.

4. Define a rachilla

   Point of attachment for a grass seed.

5. How do varieties of wheat differ?

   a. size

   b. shape or plumpness

   c. color

   d. hardness

   e. deepness of groove

   f. size of brush

   g. shape of cheeks

6. What are some differences between wheat and rye?

   Rye is longer, more slender, and has a shallower groove.
   Wheat tends to be shorter and plumper.

7. What are some differences between barley and oats?

   Barley is plumper and has ridges.
   Oats are longer, more slender and smooth.

8. Which is larger, vetch or rape?

   vetch

9. Given samples of:

bromegrass	perennial ryegrass
tall fescue	redtop
orchardgrass	Kentucky bluegrass

   a. Group the seeds according to size, then

   b. Identify the characteristics of the seed.

large	bromegrass	—	featherlike; veined
medium	orchard grass	—	seed has curve towards one end
	perennial ryegrass	—	seed is straighter than orchard grass or fescue
	fescue	—	boat shaped; rachilla is narrower than perennial ryegrass
small	red top	—	smallest, shiny; translucent
	Kentucky bluegrass	—	small boat shaped, small rachilla

10. Given the following seeds:

a. alfalfa	e. red clover
b. lespedeza	f. sweet clover
c. alsike clover	g. ladino clover
d. birdsfoot trefoil	

Identify them by color and shape.

Darker Colored Seeds	lespedeza	—	hull is dull grayish brown; seed is flattened and shiny black
	alsike clover	—	heart shaped — dark green to black in color
	birdsfoot trefoil	—	round shaped — dark brown color
	red clover	—	three shapes of seed, yellow to violet in color

Yellow-Green Colored	alfalfa	—	kidney shaped — yellow green colored
	sweet clover	—	heart or mitten shaped — variety of lighter colors
Brighter Orange-Yellow Colors	ladino clover	—	heart shaped — more yellow and some orange color

11. Name three characteristics of soybean seed which can be used to determine mixed varieties:
    a. different colored seed
    b. different shaped seed
    c. different hilum colors

UNIT E: CROP SCIENCE

PROBLEM AREA: JUDGING QUALITY OF GRAIN FOR SEED AND FOR MARKET

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is during the harvesting season or prior to the Crops Contest. The estimated time for teaching this problem area is 2 to 5 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. It is important for students to be able to evaluate grain, hay, and silage for quality as a basis for improved practices in crop production and marketing decisions.
2. It is important for students to recognize Primary Noxious, Secondary Noxious and other weeds common to Illinois.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

These materials were developed through a funding agreement, R-33-21-D-0542-388 with the Illinois State Board of Education, Department of Adult, Vocational and Technical Education, Research and Development Section, 100 North First Street, Springfield, Illinois 62777. Opinions expressed in these materials do not reflect, nor should they be construed as policy or opinion of the State Board of Education or its staff.

The teacher's guide, student worksheets, student job sheets, and sample test questions were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and transparency discussion guide were adapted by Vocational Agriculture Service, University of Illinois.

The information sheet, "Things To Look For When Judging Crops," was developed from the reference, "Judging Crop Quality" by Dungan and Bolin. The information sheet, "Illinois Noxious Weed Law," was reprinted from "Illinois Noxious Weeds, Their Description and Control." Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Crop science

II. Problem area: Judging quality of grain for seed and for market

III. Objectives: At the close of this problem area, the students will be able to:

1. Select quality grain for seed or market.
2. Describe the factors which influence the quality of seed.
3. Identify two sources of quality seed.
4. Identify the recommended procedures to follow when handling grain for seed.
5. Explain the items listed on seed tags.

IV. Suggested interest approaches:

1. Provide samples of grain of various grades and quality and have students select the samples they would use for their S.O.E.P. List reasons for their choices on the chalkboard and discuss.
2. Invite a certified seed grower to class to discuss the goals and purposes of growing and using certified seed.
3. Show film on development of hybrid seed or on the development of certified seed.
4. Ask students the following lead questions to promote interest and discussion: "How many of your dads use certified seed?" "Why do they use it?" "What is certified seed?" "What else can affect seed quality?"

V. Anticipated problems and concerns of students:

1. What are the factors that affect the quality of seed?
2. How does size of kernels affect quality and grade?
3. What information is contained on seed tags?
4. Where can we obtain good quality seed?
5. How can we judge and evaluate the quality of seed?
6. How does seed quality affect crop yields?
7. What is meant by "high quality seed?"
8. What factors should we consider when determining if we should save our own crop for seed?
9. What are the Primary Noxious Weeds in Illinois?
10. When and why should a seed grower be concerned with the noxious weeds as well as the noxious weed seeds.

VI. Suggested learning activities and experiences:

1. Identify the students' problems and concerns and record them on the chalkboard. Decide on a tentative order in which the problems and questions will be studied. Answer and discuss those questions which can be solved by students in the class.
2. Distribute Worksheet 1, "Factors Affecting Seed Quality." Show and discuss VAS Slidefilm 796, "Seed Quality – A Major Factor in Crop Yields."
3. Distribute Worksheet 2, "Factors Affecting Classes and Grades of Corn and Soybeans." Show and discuss VAS Slidefilm 734, "Factors Affecting Classes and Grades of Shelled Corn" and Slidefilm 746, "Factors Affecting Classes and Grades of Soybeans."
4. Distribute Job Sheet 1, "Placing Rings of Crops." Discuss students results.
5. Set up rings of grain for the students to judge and place. Have them give oral or written reasons for their placings.
6. Have students research current magazines and other references on selecting seed and present 3 to 5 minute reports on their findings.
7. Provide the opportunity for students to participate in the Chapter, 4-H, or FFA Grain Judging Contest.
8. Use transparencies and discussion guide to discuss the items printed on a certified seed tag.

VII. Suggestions for using this problem area:

At the close of this problem area, the students should be able to identify and select high quality seed for their S.O.E.P.

VIII. Evaluation:

1. Collect and evaluate Worksheets 1 and 2, and Job Sheet 1.
2. Evaluate students' reports.
3. Score the students' placing on crop rings.
4. Administer and grade a test on seed quality.

IX. References and aids: (Available from Vocational Agriculture Service, University of Illinois, Urbana, Illinois)

1. VAS Slidefilm 734, "Factors Affecting Classes and Grades of Shelled Corn."
2. VAS Slidefilm 746, "Factors Affecting Classes and Grades of Soybeans."
3. VAS Slidefilm 796, "Seed Quality – A Major Factor in Crop Yields."
4. Worksheets 1 and 2, Job Sheet 1.
5. Crop Judging Samples, VAS.

6. Information Sheets:

    a. Illinois Noxious Weed Law, Department of Agriculture, Bureau of Plant and Apiary Protection, Emmerson Building, Springfield, IL 62706.

    b. Things To Look For When Judging Crops.

7. Sample Test Questions.

8. Selected transparencies (28 and 29) from VAS Soybeans – Planting To Harvest packet.

INFORMATION SHEET

ILLINOIS NOXIOUS WEED LAW

Prohibited Noxious Weeds in Illinois

Annuals

1. Common Ragweed
2. Giant Ragweed
3. Marijuana

Biennials

1. Musk Thistle

Perennials

1. Canada Thistle
2. Johnson grass
3. Perennial Sowthistle
4. Sorghum Almum

INFORMATION SHEET

THINGS TO LOOK FOR WHEN JUDGING CROPS

Corn

1. Kernels not uniform
2. Kernels showing wrinkling only on germ face, but not blistered
3. Kernels slightly lacking in luster
4. Kernels lacking in depth
5. Kernels lacking in thickness
6. Excessive crown starch
7. Light weight per bushel
8. Excessive number of tip caps broken off
9. Excessive chaff attached to tip
10. Shrunken kernel tips
11. Kernels exhibiting tip starch
12. Cracked or broken kernels
13. Kernels exhibiting back starch
14. Diseased
15. Blistered or frozen kernels

Soybeans

1. Non uniformity
2. Inert material
3. Mottling
4. Scarification (open places in seed coat)
5. Poor color and luster
6. Low test weight per bushel
7. Undersize
8. Broken and cracked seeds
9. Other crops easy to separate
10. Common weed seeds
11. Unnatural green color
12. Swollen or shriveled beans
13. Other varieties of soybeans
14. Other crops hard to separate
15. Ground damage
16. Insect damage
17. Diseased and sprouted
18. Semi-harmful weed seeds
19. Noxious weed seeds

Wheat

1. Non-uniformity
2. Inert material
3. Broken or cracked seeds
4. Light weight per bushel
5. Mixture of spring and winter wheat
6. Mixture of other crops easy to separate
7. Common weeds
8. Shriveled berries (seeds)
9. Yellow berries
10. Mixture of classes other than spring and winter
11. Mixture of other crops hard to separate
12. Insect damage
13. Sprouted
14. Diseased
15. Heat damage
16. Semi-harmful weed seed

Oats

1. Non-uniformity
2. Clipping
3. Inert material
4. Hulling
5. Crops easy to separate (wheat or rye)
6. Common weeds
7. Light weight (below 32 lbs. per bushel)
8. Weathered
9. Musty
10. Sprouted
11. Other varieties of oats
12. Crops hard to separate (barley)
13. Diseases
14. Semi-harmful weeds
15. Noxious weed seed

Hay

1. Bleached color
2. Lacking in leafiness
3. Coarseness
4. Overripe condition
5. Mixture of legume hays (do not consider if judging mixed hay)
6. Mixture of other hays
7. Presence of inert material – stalky, stubble, etc.
8. Presence of common weeds
9. Presence of semi-harmful weeds
10. Presence of noxious weeds
11. High moisture content
12. Moldy condition
13. Burned or heated hay
14. Charred hay

Silage

1. Color
2. Grain content (stage of growth)
3. Moisture
4. Odor

STUDENT WORKSHEET 1

FACTORS AFFECTING SEED QUALITY

1. What resources need to be considered for obtaining top yields?

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

2. Describe how the use of poor quality seed can reduce crop yields?

____

____

3. What is meant by high quality seed?

a. ____________________

b. ____________________

c. ____________________

d. ____________________

4. Where can you secure crop seed?

____

Which is the best source? Why?

____

5. What information is contained on a seed tag? Explain each part.

____

6. Using certified seed will give you what assurances?

____

____

____

____

STUDENT WORKSHEET 2

FACTORS AFFECTING CLASSES AND GRADES OF CORN AND SOYBEANS

1. Why is it important for a grower to have a knowledge of the classes and grades of crops?

a. ____________________

b. ____________________

c. ____________________

2. Name the 3 classes of shelled corn.

a. ____________________

b. ____________________

c. ____________________

3. What determines the grades of corn?

a. ____________________

b. ____________________

c. ____________________

d. ____________________

4. List the six types of damaged kernels.

a. ____________________ d. ____________________

b. ____________________ e. ____________________

c. ____________________ f. ____________________

5. Identify the classes of soybeans.

a. ____________________ d. ____________________

b. ____________________ e. ____________________

c. ____________________

6. List the seven items affecting grades of soybeans.

a. ____________________ d. ____________________

b. ____________________ e. ____________________

c. ____________________ f. ____________________

g. ____________________

7. What factors are considered for damage in soybean seed?

a. ______________________ f. ______________________

b. ______________________ g. ______________________

c. ______________________ h. ______________________

d. ______________________ i. ______________________

e. ______________________

JOB SHEET 1

PLACING RINGS OF CROPS

Objectives:

1. To understand how various factors affect quality of grain samples.
2. To become familiar with various factors affecting quality of grain samples.
3. To develop the ability to place samples of grain within a ring.

Materials:

1. Grain samples of corn, oats, soybeans, wheat (available from Vocational Agriculture Service, University of Illinois).
2. Flat pans or trays for each sample.
3. Judging cards.

Procedures:

1. Begin by developing students' knowledge of factors to consider when looking at each sample and learning the importance of each factor.
2. Distribute the job sheet, give students the following information:
   a. Name of crop being judged
   b. Objectionable factors for each sample

   Have students give proper placing in each ring.
3. Use information sheets
   a. Things to Look for When Judging Crops
   b. Primary Noxious, Secondary Noxious and Other Weeds Commonly Found in Illinois

   until students become familiar with the weeds, factors, and their rank of importance.
4. When students master the ranking of factors, set up rings of seed samples for students to place. Use job sheet and have students evaluate each grain sample in a ring, write the objectionable factors found in each sample and give proper placing for the grain ring.

_______________ **Grain Being Judged**

Sample No. 1

Objectionable factors

a.

b.

c.

d.

Sample No. 2

Objectionable factors

a.

b.

c.

d.

Sample No. 3

Objectionable factors

a.

b.

c.

d.

Sample No. 4

Objectionable factors

a.

b.

c.

d.

Final Placing

_______________ _______________ _______________ _______________

Questions:

1. What is the difference between Primary Noxious and Secondary Noxious Weeds?

2. Why are mixed varieties objectionable when judging a sample of grain?

3. When evaluating samples for purity, what are some things to look for?

4. When evaluating samples for soundness, what are some things to look for?

Observation:

1. Become familiar with how factors are ranked from least to most objectionable in grain, hay, and silage samples.
2. Become familiar with primary and secondary (semi-harmful) weeds and their seeds.
3. Correctly place a sample of grain, hay and silage and mark an official judging score card.

Conclusions:

Discuss how the ability to evaluate and rank samples of grain can improve a student's S.O.E.P.

TEACHER'S KEY
STUDENT WORKSHEET 1

FACTORS AFFECTING SEED QUALITY

1. What resources need to be considered for obtaining top yields?

   a. Land

   b. Fertilizer

   c. Labor

   d. Machinery

   e. Seed

   f. Pest control

2. Describe how the use of poor quality seed can reduce crop yields?

   Low germination, weed problems, and less money at harvest.

3. What is meant by high quality seed?

   a. High germination.

   b. Produce vigorous plants.

   c. Minimum inert material.

   d. Produce high yielding plants, disease and insect resistant.

4. Where can you secure crop seed?

   Home grown, neighbor, elevator, seed dealer.

   Which is the best source? Why?

5. What information is contained on a seed tag? Explain each part.

   Refer to transparency 28, Soybeans – Planting To Harvesting

6. Using certified seed will give you what assurances?

   Varietal purity, laboratory inspected, vigorous germination, weed free, free of other crop seed, clean, cheaper per cost of live seed/lb.

TEACHER'S KEY
STUDENT WORKSHEET 2

FACTORS AFFECTING CLASSES AND GRADES OF CORN AND SOYBEANS

1. Why is it important for a grower to have a knowledge of the classes and grades of crops?

   a. So grower will be paid for quality grain.

   b. So buyer may purchase quality grain he requires.

   c. To assist producer in better marketing of grain.

2. Name the 3 classes of shelled corn.

   a. Yellow

   b. White

   c. Mixed

3. What determines the grades of corn?

   a. Minimum test weight per bushel

   b. Moisture content

   c. Cracked corn and foreign matter

   d. Damaged kernels

4. List the six types of damaged kernels.

   a. Heat

   b. Sprouted

   c. Ground and weather

   d. Frosted

   e. Insect

   f. Disease

5. Identify the classes of soybeans.

   a. Yellow

   b. Green

   c. Brown

   d. Black

   e. Mixed

6. List the seven items affecting grades of soybeans.

   a. Test weight

   b. Moisture

   c. Splits

   d. Total damage

   e. Heat damage

   f. Percent foreign matter

   g. Mixture of other soybean varieties

7. What factors are considered for damage in soybean seed?

a. Heat

b. Sprouted

c. Frosted and immature

d. Weather

e. Ground

f. Moldy

g. Materially damaged

h. Diseased

i. Insect

DISCUSSION GUIDE

JUDGING QUALITY OF GRAIN FOR SEED AND FOR MARKET

28. To be certain that a variety is true to name, it is best to use seed which is certified.

Seed which is certified will bear a label which is similar to the one shown. All of the information would be included on the tag so you would know exactly what you were planting.

Variety – The type of subdivision of soybean species that you have.

Lot Number – Limited to 5000 bushels of seed. Seed of the same species and variety, grown in different fields but mixed to form a "lot".

Pure Seed – The percentage of seed that will produce plants true to variety and type.

Inert Matter – The percentage by weight of chaff, broken seeds, stems and soil particles.

Weed Seeds – The percentage by weight of seeds that are considered weeds.

Other Crop Seed – The percentage by weight of seeds not of the specified variety.

Germination – The percentage of seeds that will produce normal plants under normal conditions.

Hard Seeds – The percentage of seeds which remain hard and sound at the end of a germination period.

CERTIFIED SEED TAG

KIND VARIETY LOT NO
ORIGIN
PURITY % WEED SEED % INERT MATTER %
OTHER CROP SEED % GERM. DATE
GERMINATION % HARD SEED %
NAME AND NO. NOXIOUS WEEDS PER OZ.
VENDOR
ADDRESS

29. In order to ensure a good crop, you must do a good job of selecting seed. Samples of soybean seed were checked and the analysis showed that farmers who purchased certified seed obtained a high quality seed on the average than farmers purchasing uncertified seed.

This evidence indicates that the Illinois farmer could improve the potential of his soybean production by using higher quality seed.

Certified and Uncertified Soybean Seed Analysis (In Percent)

Seed type[1/]	Germination	Pure seed	Weed seed	Inert matter	Other crops
Uncertified	80.2	95.5	.02	2.6	2.0
Certified	84.2	98.7	.001	1.2	.2

[1/] Analysis on 363 samples of uncertified and 56 samples of certified.

TEACHER'S KEY
SAMPLE TEST QUESTIONS

JUDGING QUALITY OF GRAIN FOR SEED AND FOR MARKET

True or False

T 1. Soybeans have different colored hilems.

F 2. Quackgrass is a recommended crop for Illinois.

F 3. In judging hay, texture (courseness of stems) is more important than leafiness.

F 4. In judging silage, the color of the silage is more important than grain content.

F 5. A bushel of soybeans weigh 72 pounds at correct moisture.

F 6. Fescue is not recommended for pasture in Illinois.

T 7. Noxious weed seeds are a serious defect in judging grain samples.

T 8. Wheat and rye are two crops hard to separate when judging grain samples.

T 9. Johnson grass is a primary noxious weed in Illinois.

F 10. A mixture of oats and barley is easy to separate when judging grain samples.

Short Answer

11. What is inert matter?

generally all material other than specifically grown crop seed

12. How is certified seed different from home grown seed?

has guarantee of certain % quality and cleanness of seed

13. Name two good sources of seed.

a. local elevator

b. seed dealer

14. What should be considered when deciding if you should save your own crops for seed?

market value
storage
cleaning
shrinkage

labor
germination
purity

15. Identify the following as a class, grade, or damage in soybean seed. Place a "C," "G," or "D" in front of the items below.

D Sprouted soybeans

C & G Mixture of other soybeans

D Heat

D Frosted

(cont.)

C Brown soybeans

G Test weight per bushel

C Yellow soybeans

D Moldy soybeans

D Diseased

C Green soybeans

G Foreign materials

D Insect refuse

16. Name four factors considered when grading corn.

a test weight

b. moisture

c. cracked and foreign matter

d. damaged kernels

17. A bushel of shelled corn weighs 56 lbs. and a bushel of soybeans weighs 60 lbs.

18. Diseased shelled corn includes corn that is damaged by rots, molds and other organisms.

19. List the three classes of shelled corn.

a. yellow

b. white

c. mixed

20. Name six things which can cause damaged corn kernels.

a. heat

b. sprouted

c. ground and weather

d. frosted

e. insects

f. diseases

UNIT E: CROP SCIENCE

PROBLEM AREA: GROWING CORN

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is spring prior to planting of corn. The estimated time for teaching this problem area is 5 to 10 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. Corn is a major Illinois crop and students in agriculture need a basic understanding of corn production.
2. Students need to be aware of local practices used in corn production.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

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The teacher's guide, student worksheets, student job sheets, and sample test questions were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and transparency discussion guide were adapted by Vocational Agriculture Service, University of Illinois.

The information sheet, Planting Date, Starter Fertilizer, and Corn Yield, was reprinted from the Agricultural Research Magazine, University of Illinois. The skill sheet, Row Crop Planter Unit, was originally developed by H. Edward Breece through Iowa State University. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Crop production

II. Problem area: Growing corn

III. Objectives: At the close of this problem area the student will be able to:

1. Describe the characteristics of a good seedbed for corn.
2. Describe the functions of the implements used to prepare the seedbed for corn.
3. List the factors to consider in selecting a variety of corn.
4. Explain the most recent research findings pertaining to time of planting, depth of planting, width of rows, planting populations, and method of seedbed preparation for planting corn.
5. Understand the importance of fertilizer to the corn crop.
6. Describe the recommended cultural and chemical practices used to control weeds, diseases, and insects in corn.
7. List the major problems of growing corn from planting to knee high, knee high to tasseling.

IV. Suggested interest approaches:

1. Compile data pertaining to corn acreage and yields from census data, federal and state agricultural reports. Using the data collected, have each student develop realistic goals for corn production in the community. Ask students to indicate what problems will be encountered in achieving their goals.
2. Make a display of recommended varieties of corn planted in the community.
3. Make a display of plant specimens illustrating a normal plant, disease damage, insect damage and plant food deficiencies.
4. At planting time, conduct a field trip to a student's farm who has a corn project.
5. Show a film on the latest research on the development of new varieties of corn.

V. Anticipated problems and concerns of students:

1. What corn yields should be expected in the local area? What factors can influence yields?
2. Why is an understanding of the corn plant development necessary for an agriculturalist concerned with corn production?
3. What are the parts of the corn plant?
4. What are the stages of growth for a corn plant?
5. What factors should be considered in selecting a variety of corn?

6. What are the recommended varieties of corn for this area of Illinois?

7. What causes a variety of corn to mature earlier than another?

8. Where can I obtain good quality seed corn?

9. Is it necessary to run a germination test on seed corn before planting?

10. What precautions should be followed during handling of seed corn to prevent injury?

11. How important are each of the major nutrients (N, P, and K) in the production of corn?

12. What are the rules-of-thumb in applying N, P, and K for corn?

13. Where and when in the cropping plan should the recommended fertilizer be applied?

14. What are the characteristics of a good seedbed for corn?

15. What tillage practices are used to prepare seedbeds for corn?

16. What equipment is needed for corn production?

17. What are the most recent research findings pertaining to:

    a. Time of planting
    b. Depth of planting
    c. Method of planting
    d. Width of rows
    e. Planting populations

18. What weeds and grasses are of major concern in the production of corn in the community?

19. What practices are used to control the weeds and grasses in corn?

20. What precautions should be followed when using pesticides?

21. What diseases and insects are causing significant damage to corn in the community?

22. What practices should be followed to control the diseases and insects in corn?

23. What are the major problems in growing corn?

VI. Suggested learning activities and experiences:

1. List the problems and concerns raised by students in the class on growing corn. Decide on a tentative order in which the problems and questions will be studied. Answer and discuss those questions which can be answered by the students in the class.

2. Use colored slides or transparenices to show and identify the stages of growth and parts of the corn plant.

3. Distribute Worksheet 1, "Identification of Parts of the Corn Seed and Plant." Discuss the importance of understanding the names and functions of the parts of the corn seed and plant.

4. Develop a "growth calendar" on the chalkboard to show the time of year when most corn plants are passing through each growth stage.

5. Distribute ears of corn, show slides or use flash cards to discuss with the class the parts of the ear. Evaluate ears of different sizes and shapes--try to determine the causes of the differences.

6. Secure "mutant" seed from seed corn companies and germinate to illustrate the influence of genetics. Have students keep daily records and notes of the seeds planted in flats. Use Job Sheet 1, "Planting Corn for Classroom Demonstrations."

7. Arrange for an implement dealer or farmer to demonstrate the calibration of a corn planter. Hand out operator manuals for planters or have students bring manuals from home, discuss adjustments and maintenance of planters. Use transparencies number 32 and 43 for information on planter parts and fertilizer placement.

8. Have available samples of pesticides used to control pests in corn. Secure and study labels from different herbicides and insecticides. Stress the safe use and handling of chemicals.

9. Place different herbicides on the corn plants growing in the flats to observe the effects. Have students keep notes on the effects the herbicides have on various weeds and corn in the flats. Use Job Sheet 2, "Determining Herbicides Effects on Corn."

10. Show and discuss slides or flash cards of corn plants with disease and insect damage. Secure and prepare a bulletin board of various cultural practices used to control the corn diseases and insects.

11. Hand out Worksheet 2, "Preparing the Seedbed and Selecting a Variety of Corn." Use VAS Unit 4039a, "Producing High Corn Yields" for reference. A supplementary reference is the text"Modern Corn Production."

12. Hand out Worksheet 3, "Planting and Growing Corn." Use VAS Unit 4039a and VAS Slidefilm 731, "Planting Corn" for reference. Supplement with "Modern Corn Production" textbook. Use Job Sheet 3, AM 18-72, Row Crop Planter Unit, for additional "hands-on" experience.

13. Show and discuss the slidefilm series (732–1 and 732–2) on corn problems, "Planting to Knee High" and "Knee High to Tasseling."

14. Use the selected transparencies in this problem area as an aid for discussion of tillage and seedbed preparation.

VII. Suggestions for using this problem area:

1. The main purpose of this problem area is to introduce the students to approved and recommended practices of corn production for their S.O.E. projects.

2. This problem area should provide the students with a general knowledge and understanding of the importance of the corn crop to Illinois and their community.

3. Students with corn projects should implement as many approved practices as possible during the growing season.

VIII. Evaluation:

1. Collect and grade Worksheets 1 – 3.

2. Evaluate the students' notes and reports on Job Sheets 1, 2, and 3.

3. Administer and evaluate a test over the problem area.

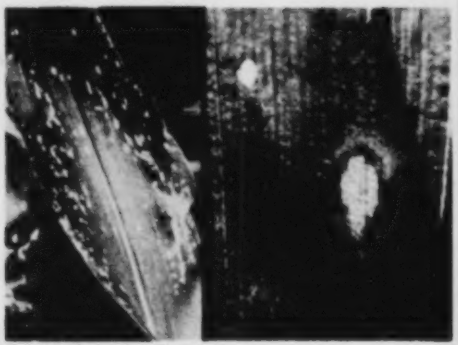
IX. References and aids: (Available from Vocational Agriculture Service, University of Illinois, Urbana, IL, except Modern Corn Production text.)

1. VAS Unit 4039a, Producing High Corn Yields.
2. VAS Unit 4041, Minimum Tillage.
3. Slidefilm 731, Planting Corn.
4. Slidefilm 732–1, Corn Problems – Planting to Knee High.
5. Slidefilm 732–2. Corn Problems – Knee High to Tasseling.
6. VAS Unit 4011a, Hunger Signs in Crops.
7. VAS Unit 3021, The Planter – Selection, Adjustment, Maintenance and Use.
8. Pesticide materials, sample labels.
9. VAS Unit 4040, Corn Insects.
10. Picture Sheets – Corn Diseases, Insects, and Herbicide Injury I and II.
11. Agronomy Handbook.
12. Selected transparencies from VAS Packet, Soybeans – Planting To Harvest.
13. Modern Corn Production, A & L Publications, Station A, Box F, Champaign, IL 61820.

CORN DISEASES I

1. Stewart's bacterial wilt, L, leaf blight; C, seedling stalk rot; R, flea beetle

2. Goss' wilt. L, leaf and R, stalk symptoms

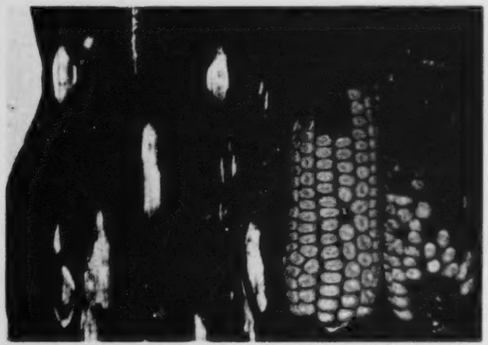

3. Holcus leaf spot

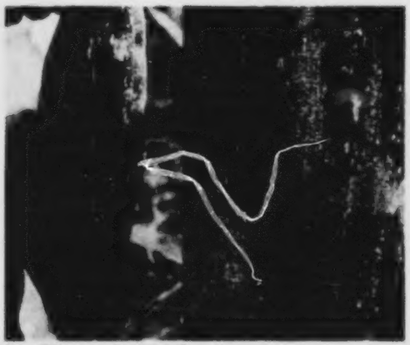
4. Eyespot

5. Yellow leaf blight. L, leaf spots; R, lesion with pycnidia

6. Southern leaf blight

7. Northern leaf blight


8. Helminthosporium leaf spot (blight) and ear rot


9. Physoderma brown spot

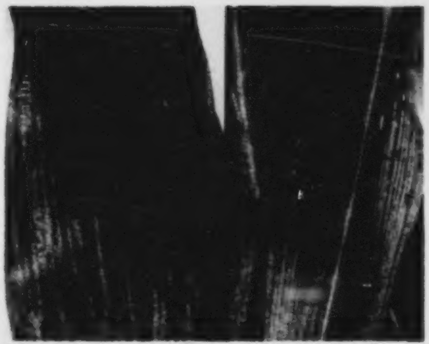
10. Zonate leaf spot

11. Sorghum downy mildew

12. Crazy top

13. Common rust

14. Gray leaf spot


15. Corn viruses. L, wheat streak mosaic; R, maize dwarf mosaic

16. Genetic leaf spot

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

PLANT DISEASE NO. 1
JANUARY 1980
URBANA, ILLINOIS

CORN DISEASES I

1. **Stewart's Bacterial Wilt**, caused by the bacterium *Erwinia stewartii*, is most severe following mild winters. Long, pale green to yellow or tan streaks with wavy margins form in the leaves. The streaks soon turn dry and brown, starting at feeding scratches made by the corn flea beetle (*Chaetocnema pulicaria*). Dark brown cavities may form in the lower stalk pith. Infected plants sometimes produce premature, bleached and dead tassels. The bacterium overwinters in the corn flea beetle.

2. **Goss' Wilt**, caused by the bacterium *Corynebacterium nebraskense*, occurs in Nebraska and areas of bordering states. Water-soaked streaks, parallel to the leaf veins, occur on the leaves. Dark, angular, water-soaked spots (freckles) form next to the leaf veins. The fibrovascular bundles in systemically-infected stalks are discolored. Affected plants may be stunted. Plants can be infected, wilt and die at any stage. The bacterium overwinters in corn debris near the soil surface and in seed.

3. **Holcus Leaf Spot**, caused by the bacterium *Pseudomonas syringae*, appears as round-to-elliptical spots, up to 1 cm in diameter, on the lower leaves. The dark green and water-soaked spots dry to a creamy-white to tan with a brown or reddish margin; some are surrounded by a yellowish halo. The bacterium survives in corn, grass and sorghum debris.

4. **Eyespot**, caused by the fungus *Kabatiella zeae* (perfect stage, *Aureobasidium zeae*), occurs in the northern USA during cool wet weather. Numerous, round-to-oval spots, up to ½ cm in diameter, with a tan-to-cream center, brown to purple margin, and surrounded by a yellowish halo, form on the leaves. The upper leaves may wither and die prematurely, late in the season. The fungus overwinters in corn debris on or near the soil surface.

5. **Yellow Leaf Blight**, caused by the fungus *Phyllosticta maydis* (perfect stage, *Mycosphaerella zeae-maydis*), is most prevalent in northern areas of the USA after extended cool, moist weather. Rectangular to oval, yellow-to-tan spots, often surrounded by a red and purple margin and a broad yellowish area, form on the leaves. Black specks (pycnidia) form in older lesions. If severe early, the lower leaves turn yellow, wither and die. The fungus overwinters in corn, foxtail, and Sudangrass debris on the soil surface.

6. **Southern Corn Leaf Blight**, caused by the fungus *Helminthosporium maydis* (perfect stage, *Cochliobolus heterotrophus*), is most prevalent in about the southern half of the USA following warm, moist weather. Leaf lesions are tan with buff-to-brown borders, elongated between the veins, generally parallel-sided, and up to 1 by 3 cm. Two races of the fungus exist, Race O and Race T, which devastated the corn crop in much of the USA during 1970, but has been practically eliminated by planting resistant hybrids. The fungus survives on corn refuse on or close to the soil surface.

7. **Northern Corn Leaf Blight**, caused by the fungus *Helminthosporium turcicum* (perfect stage *Trichometasphaeria turcica*), is most prevalent in the northern half of the USA following warm, moist weather and heavy dews. Long, elliptical, grayish-green and tan lesions on the leaves may be up to 4 by 15 cm. They usually appear first on the lower leaves. When severe, a plant may turn grayish-green and die early. The fungus overwinters on corn debris.

8. **Helminthosporium Leaf Spot (Blight)**, caused by the fungus *Helminthosporium carbonum* (perfect stage, *Cochliobolus carbonum*), appears as round-to-oval or linear tan spots up to 1 by 3 cm. The lesions somtimes develop concentric zones and brown margins. Leaf sheaths, husks and ears are also infected by certain races. The fungus overwinters in corn debris.

9. **Physoderma Brown Spot**, caused by the fungus *Physoderma maydis*, occurs chiefly in the Southeastern states following hot, moist weather. Very small, round to oblong yellowish spots often occur in bands on leaves, sheaths and stalks below the ear. The yellowish lesions turn chocolate- to reddish-brown and may merge to form angular or irregular blotches. Infected stalks may break at the nodes. The fungus overwinters in corn debris and soil.

10. **Zonate Leaf Spot**, caused by the fungus *Gloeocercospora sorghi*, is found mostly in the Gulf states. Lesions, which occur mainly on older leaves, are reddish-brown, water-soaked, and may enlarge up to 2.5 to 5 cm in diameter. Aging lesions develop a targetlike pattern. Other hosts include sorghum, Sudangrass, Johnsongrass, and sugarcane. The fungus overwinters in crop debris.

11. **Sorghum Downy Mildew**, caused by the fungus *Peronosclerospora (Sclerospora) sorghi*, is found as far north as extreme southern Indiana and Illinois where it is more important on sorghum and sorghum-Sudangrass hybrids. Plants are often stunted and yellowish, sometimes with chlorotic to white-striped leaves. A whitish downy growth may appear on either leaf surface in damp weather. Barrenness and poor ear fill accompany severe infection. The fungus survives in the soil and is spread by sowing infected seed.

12. **Crazy Top**, caused by the widespread soil-borne fungus *Sclerophthora (Sclerospora) macrospora*, infests plants when the soil is waterlogged sometime before the seedlings are 10 to 15 cm tall. The tassel is partially or completely replaced by a plumy mass of small leaves. Diseased plants may be quite stunted and tiller excessively with lighter green, often narrow, straplike, and leathery leaves. Ear shoots may be numerous, elongated, leafy, and barren. The fungus survives the refuse of many grasses and in soil.

13. **Common Rust**, caused by the fungus *Puccinia sorghi*, often appears after silking following warm, moist weather. Small, round to elongate, golden- to cinnamon-brown pustules form on both leaf surfaces and other above ground plant parts. The pustules turn chocolate-brown to black as the plant matures. When severe, the leaves may turn yellow, wither and die early. The fungus overwinters on living plants in southern states and spreads northward by wind-borne spores.

14. **Gray Leaf Spot**, caused by the fungi *Cercospora zeae-maydis* and *C. sorghi* var. *maydis*, occurs in warm-to-hot humid areas, especially where minimum tillage is practiced. Long, narrow, parallel-sided, tan or gray-to-tan or yellow spots, up to ½ by 2 to 5 cm, may merge forming large gray blotches with irregular margins that kill the leaves. The fungus overwinters in corn debris on or near the soil surface.

15. **Corn Viruses. A. Wheat Streak Mosaic Virus**, transmitted by feeding of the wheat curl mite (*Aceria tulipae*), infects many grasses including wheat and corn. If severe, corn plants may be stunted and yellowed. Small, oval to elliptical yellowish spots and streaks form on young leaves. The streaks elongate and develop parallel to the veins. Severely affected plants form small ears with a poor seed set. The virus and its mite vector require living cereal, grass or corn plants to survive. **B. Maize Dwarf Mosaic**, caused by several strains of the sugarcane mosaic virus, is transmitted by the feeding of over 20 species of aphids. Angular, light and dark green mottling on young leaves develops into narrow, light-green or yellowish streaks along the veins. Early-infected plants are stunted and yellowish-green with a poor seed set. Plants infected after silking time may appear nearly normal. The virus infects over 200 species of wild and cultivated grasses. Johnsongrass is the only important overwintering host in most of the USA.

16. **Genetic Leaf Spot** is one of many white-to-yellow flecks, spots and streaks that develop on corn leaves; not necessarily uniformly on a plant. Often only a few scattered plants in a field are affected.

For chemical control suggestions, a listing of resistant varieties, and other control measures, consult the Extension Plant Pathologist at your land-grant university, or your county extension office.

Photo credits: F. M. Latterell (1L), University of Illinois (1C, 1R, 6, 7, 8R, 11, 12, 15L, 16), University of Nebraska (2L), L. Claflin (2R), H. G. Johnson (3L), G. W. Simone (3R, 10, 13), T. M. Sjulin (4), G. L. Sheifele (5L), N. A. Smith (5R), A. J. Ullstrup (8L), E. E. Burns (9L), W. G. Willis (9R), R. E. Stuckey (14), and M. T. Turner (15R).

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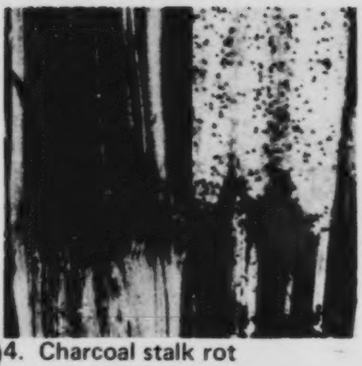
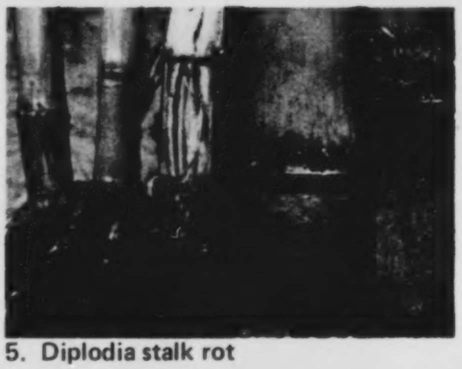
CORN DISEASES II

1. Seedling blight

2. Common smut

3. Nematode damage. L, to roots; R, damaged area in a field

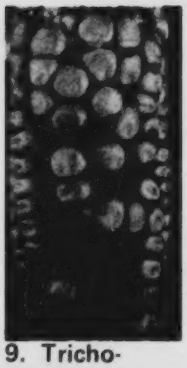

4. Charcoal stalk rot


5. Diplodia stalk rot

6. Gibberella stalk rot

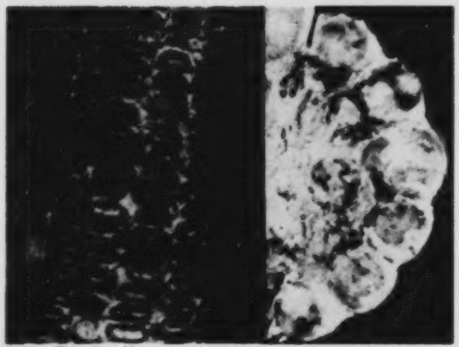
7. Anthracnose. L, stalk rot; C, top-dieback; R, leaf blight

8. Kernel red streak


9. Trichoderma ear rot

10. Fusarium kernel or ear rot

11. Gibberella ear rot


12. Diplodia ear rot

13. Nigrospora ear rot

14. Aspergillus ear rot and storage mold

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

PLANT DISEASE NO. 2
JANUARY 1980
URBANA, ILLINOIS

CORN DISEASES II

1. **Seedling Blight** may be caused by numerous fungi, several in the genus *Pythium*. Seeds may decay in the soil or seedlings rot before emergence. Seedlings that do emerge lack vigor, are yellow, stunted, wilt, and die from a tan to dark-brown decay below the soil line that results in a poor, uneven stand. Damage is more severe in cold, wet soil than in warm soil. The causal fungi survive in soil, crop debris and seed.

2. **Common Smut** or boil smut, caused by the fungus *Ustilago maydis*, is widely distributed over the world. Small to large galls form on any actively growing, above ground plant part. The galls are covered with a glistening white membrane that later ruptures to release masses of black smut spores. Large galls on the ear and above are more destructive than galls below the ear. Initial infections to young plants come from spores in corn debris, soil or manure. Secondary infections occur in the field.

3. **Nematode Damage** to corn roots may be caused by a number of different species of plant-parasitic nematodes including awl, burrowing, dagger, lance, needle, ring, root-knot, root-lesion, spiral, sting, stubby-root, stunt, and probably others. Damaged plants are stunted and uneven in height, often chlorotic, may wilt during midday, and lack vigor in oval to irregular areas of fields. Roots that form are usually shallow, stubby and "nubbed-off," or develop indistinct swellings to knot-like galls, and may branch excessively with few or no feeder rootlets. The roots often have dark, discolored areas and may be rotted. Weakened plants produce smaller and fewer ears that are poorly filled. The nematodes may survive in soil indefinitely by infecting a wide range of other host plants.

4. **Charcoal Stalk Rot** is caused by the fungus *Macrophomina phaseolina*. Pith tissue in the lower stalk may shred. Black specks (sclerotia) form in large numbers on the fibrovascular bundles, giving rotted pith tissue a charcoal-like appearance. Affected stalks may break over (lodge). The disease is most common in the southern half of the USA, especially in the eastern Great Plains. The fungus survives as sclerotia in soil and debris of many crops, including corn.

5. **Diplodia Stalk Rot** is caused by the fungus *Diplodia maydis*. Affected plants often die early with the leaves suddenly turning a dull grayish-green similar to frost injury. The lower parts of the green stalk turn tan to dark brown and the pith disintegrates. Diseased stalks are weakened and break readily. In the fall, raised black specks (pycnidia), that can not be scraped off with the thumbnail, are clustered near the nodes in dead stalks. The fungus survives in corn debris and seed.

6. **Gibberella Stalk Rot** is caused by the fungus *Gibberella zeae* (asexual stage, *Fusarium roseum* f. sp. *cerealis* 'Graminearum'). The disease is widely distributed in the northern half of the Corn Belt. External symptoms are much like those of Diplodia Stalk Rot (5). A pink to reddish rot disintegrates the pith. Superficial black specks (perithecia), that are easily scraped off with the thumbnail, form on dead stalks. The fungus survives in corn and cereal debris and rarely on seed.

7. **Anthracnose** is caused by the fungus *Colletotrichum graminicola*. Enlarging, oval to spindle-shaped, yellow-to-brown lesions with distinct borders form in the leaves. Entire leaves may turn yellow-to-brown and die. Leaf lesions appear mostly on young plants and frequently on the upper leaves after silking. Black streaks appear on the lower stalk late in the season, with the pith dark brown and shredded. The tops of affected plants may turn yellow or red prematurely and the upper or lower stalk may break over. Numerous, black, spiny fruiting bodies (acervuli) form on the surface of the dead tissue. The fungus survives in corn debris and seed.

8. **Kernel Red Streak** is caused by a toxin secreted by the wheat curl mite (*Aceria tulipae*). Red streaks form on the sides of the kernels and often extended over the caps. Originally this disorder was believed to be a symptom of the wheat streak mosaic virus. The condition is usually most pronounced on kernels near the tip of the ear. Striking differences occur among inbred lines and hybrids in the amount and intensity of red streaking. White corn hybrids generally show less red streaking than most yellow corns.

9. **Trichoderma Ear Rot** is caused by the fungus *Trichoderma viride*. A white mold growth that later turns green and powdery forms on and between the kernels and husks. It commonly follows damage by other leaf or ear infections. Trichoderma appears when rainfall is above average the month before harvest.

10. **Fusarium Kernel or Ear Rot**, caused by the fungi *Fusarium moniliforme* and *F. m.* var. *subglutinans*, is probably the most widespread disease attacking corn ears. The caps of individual kernels or groups of kernels scattered over the ear develop a salmon-pink to reddish-brown discoloration. A powdery, cottony-pink mold forms later. Infection commonly follows some sort of injury. The same fungi may cause a stalk rot that is difficult to tell from Gibberella Stalk Rot (6). The fungi survive in corn debris and seed.

11. **Gibberella Ear Rot**, sometimes called red ear rot, is caused by the same fungus that produces Gibberella Stalk Rot (6). It is found most frequently in the cooler and more humid areas of the USA when the weather during the month or six weeks prior to harvest is unusually wet. A pink-to-reddish mold, often starting at the ear tip, grows on and between the kernels and tightly stuck husks. Infected ears are toxic to swine, dogs and man.

12. **Diplodia Ear Rot** or dry rot is caused by the same fungus that induces Diplodia Stalk Rot (5) and seedling blight. Husks of early-infected ears appear bleached or straw-colored in contrast to the green of healthy ears. The entire ear may rot, turn grayish-brown, shrunken, and remain upright with the husks stuck tightly together. Part or all of the ear is rotted with a white mold growing between the kernels. Black specks (pycnidia) may form at the base of the husks and/or on the sides of the kernels. Infections usually begin at the base of the ear and progress toward the tip.

13. **Nigrospora Ear Rot** is caused by the fungus *Nigrospora oryzae* (perfect stage, *Khuskia oryzae*). Symptoms are not conspicuous until harvest. Ears are lightweight with the cob shredding easily, usually at the butt end. Kernels are loose on the cob, slightly bleached, with numerous round, black specks (spores) forming at the tip end. Affected ears are lightweight and the kernels are poorly finished. The disease occurs when growth is checked by drought, poor soil, frost, insects, or other diseases. The fungus survives in corn debris.

14. **Aspergillus Ear Rot and Storage Mold** may be caused by a number of species of fungi in the genus *Aspergillus*. The powdery mold growing on and between or within the kernels is usually black, greenish-yellow, or tan. The germ is discolored or dead. The disease is most common in the field when the weather is unusually wet for the month prior to harvest. Affected corn kernels may "cake" together in storage to form a crust, usually at the center and top of a bin. Some strains of the common fungus *Aspergillus flavus*, occasionally produce mycotoxins (aflatoxins) that are harmful if fed to poultry, swine, beef and dairy cattle, or if consumed by humans.

For chemical control suggestions, a listing of resistant varieties, and other control measures, consult the Extension Plant Pathologist at your land-grant university, or your county extension office.

Photo credits: University of Illinois (1, 2R, 3, 4L, 5, 7R, 10, 11, 12L, 14L), R. W. Samson (2L, 8), Clemson University Extension Service and USDA (4R), T. M. Sjulin (6, 9, 13), G. W. Simone (7L, 12R), D. W. Scott (7C), and J. Tuite (14R).

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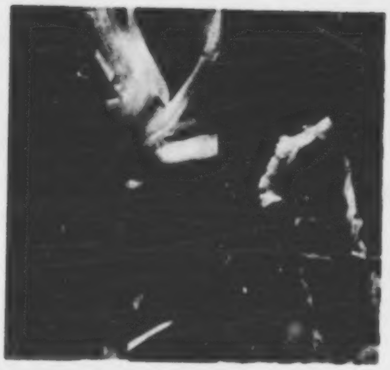
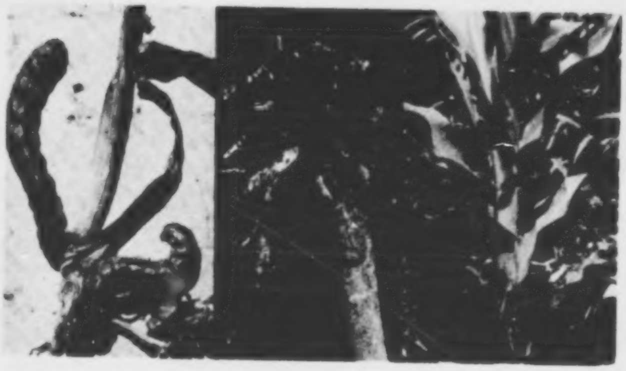
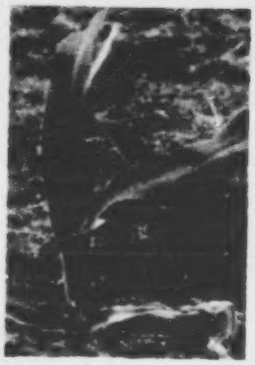
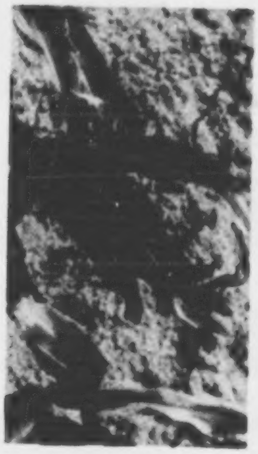
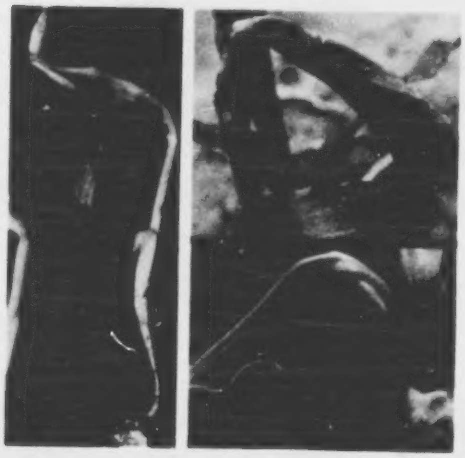
CORN HERBICIDE INJURY I

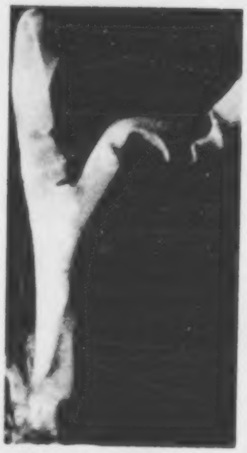

1. Frost injury

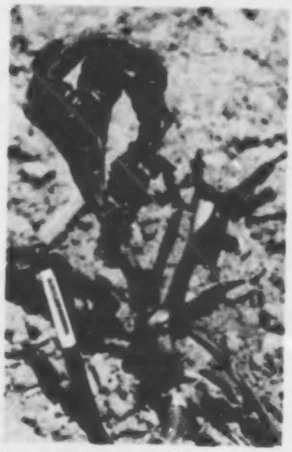

2. Insect damage

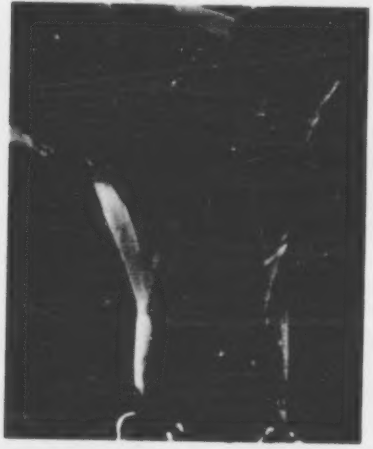

3. Cyanazine, preemergence

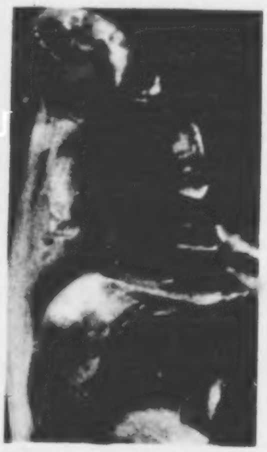

4. Linuron, preemergence

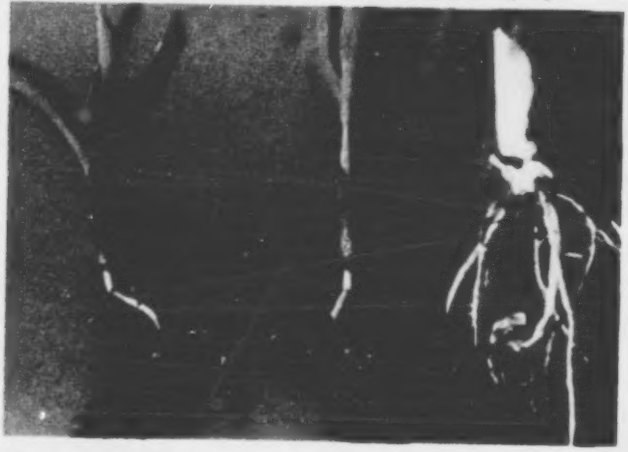

5. Acetanilide herbicide injury


6. Underground leaf unfurling


7. Thiocarbamate herbicide injury


8. Pendimethalin, preemergence


9. Alachlor and dicamba, preemergence


10. Benzoic acid herbicide injury

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COOPERATIVE EXTENSION SERVICE
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HERBICIDE INJURY NO. 1
MAY 1980
URBANA, ILLINOIS

CORN HERBICIDE INJURY I

1. **Frost injury** – Information on environmental conditions prior to appearance of injury symptoms is necessary, since environmental stress may cause symptoms that might be confused with herbicide injury.

2. **Insect damage** – Factors such as dry soil conditions, shallow planting, insect damage, or disease may also cause symptoms or problems confused with herbicide injury.

3. **Cyanazine, preemergence** – Chlorosis and necrosis of corn leaves, beginning at the leaf tips, may result from over application of cyanazine (Bladex) applied preemergeence. Injury may occur under prolonged cool, wet stress conditions.

Avoid use of cyanazine on sandy soil or soils very low in organic matter.

4. **Linuron, preemergence** – The risk of injury to corn from soil-applied treatments of linuron (Lorox) is usually considered too great to recommend its use for corn. Plants appear stunted with yellowing and necrosis of the leaves from the tips back.

5. **Acetanilide herbicide injury** – Excessive rates of alachlor (Lasso) or metolachlor (Dual) may cause improper unfurling of corn leaves. Corn seedlings may appear malformed and stunted. Injured plants usually outgrow this damage once emerged. Injury may be confused with corn germ injury or crusting.

6. **Underground leaf unfurling** – Germinating corn affected by excessive rates of Lasso or Dual may result in plants leafing out underground. The problem may become more severe with deep planting, soil crusting, and certain sensitive corn hybrids.

7. **Thiocarbamate herbicide injury** – Thiocarbamate herbicides such as butylate (Sutan) or EPTC (Eptam) may cause stunting, twisting, and knotting of some corn plants. Sutan+ and Eradicane have a "crop safener" in the formulation. This reduces but may not eliminate the risk of injury, especially with certain sensitive corn hybrids.

8. **Pendimethalin, preemergence** – Pendimethaline (Prowl is a dinitroaniline herbicide that should only be surface-applied (preemergence) for corn and not incorporated. If incorporated, pendimethalin may cause pruning and stunting of corn roots.

9. **Alachlor and dicamba, preemergence** – Preemergence combinations of alachlor (Lasso) or metolachlor (Dual) and dicamba (Banvel) should only be used on soils relatively high in organic matter and under conditions favorable for rapid corn emergence and growth. Since any one of these herbicides may cause injury when applied alone, the combination may result in symptoms of acetanilide and/or benzoic acid herbicide injury (No. 5 and 10).

10. **Benzoic acid herbicide injury** – The primary root system of corn may show proliferation and appear stubby where excessive rates of dicamba (Banvel) applied preemergence have accumulated over the germinating seed.

Other benzoic acid herbicides, such as chloramben (Amiben), which is also a benzoic acid herbicide, may cause a proliferation of stubby roots as well as stunting of the corn plant.

Photo credits: Joe Paul Downs, Michael D. K. Owen, Ellery L. Knake, Marshal D. McGlamery; University of Illinois at Urbana-Champaign, Extension Agronomists.

Subject Matter: Joe Paul Downs, University of Illinois at Urbana-Champaign, Extension Agronomist, Review by Marshal D. McGlamery, Agronomy Dept., University of Illinois at Urbana-Champaign.

Graphic Design: Martha Martin.

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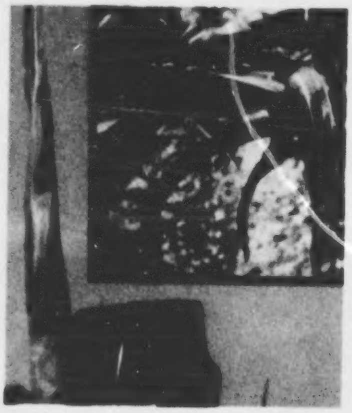
CORN HERBICIDE INJURY II

1. Anhydrous ammonia injury

2. Atrazine and oil, postemergence

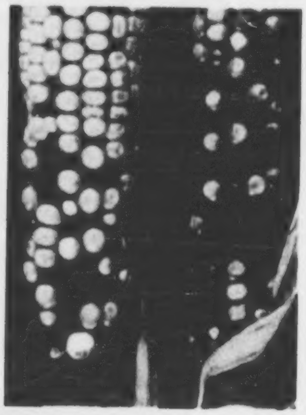


3. 2,4-D, postemergence— "onion leafing"

4. 2,4-D, postemergence— "stalk breakage"

5. 2,4-D, postemergence— "elbowing"

6. 2,4-D, postemergence— "brace root injury"



7. 2,4-D, postemergence — "tassel" to "dough" stage

8. Dicamba, postemergence near tassel

9. Linuron, directed postemergence

10. Paraquat drift injury

11. Glyphosate, spot treatment

12. Dinitroanaline carryover

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

HERBICIDE INJURY NO. 2
MAY 1980
URBANA, ILLINOIS

CORN HERBICIDE INJURY II

1. Anhydrous ammonia injury – Plant tissue is sensitive to anhydrous ammonia vapor. Corn leaf tissue contacted by anhydrous ammonia may show symptoms of "burn" or necrosis. Emerging corn seedlings may also be injured when contacted by excessive amounts of anhydrous ammonia. Symptoms of injury include inhibition of seed germination or destruction of root and coleoptile tissue.

2. Atrazine and oil, postemergence – Postemergence injury from atrazine and oil or cyanazine (Bladex) includes symptoms of leaf necrosis. Plants under stress from adverse weather conditions are more susceptible (Part I, No. 3).

3. 2,4-D, postemergence – "onion leafing" – Symptoms of 2,4-D injury include "onion leafing," "elbowing," and malformed brace roots. Certain corn hybrids are more susceptible to injury than other hybrids.

The risk of corn injury from dicamba (Banvel) may be less than with 2,4-D. However, corn may occasionally be injured by postemergence applications of Banvel. Symptoms are similar to those caused by 2,4-D.

4. 2,4–D, postemergence – "stalk breakage" – 2,4-D may make corn stalks brittle for one or two weeks after application, increasing the risk of stalk breakage by wind or cultivation equipment. Avoid cultivation during this critical period.

5. 2,4-D, postemergence – "elbowing" – Excessive rates of 2,4-D applied to rapidly growing corn or certain corn hybrids may result in "elbowing" or lodging of corn stalks. Symptoms may appear similar to lodging damage caused by corn rootworm larvae.

Avoid applying 2,4-D or Banvel to corn under stress from adverse weather conditions.

6. 2,4-D, postemergence – "brace root injury" – Excessive rates of 2,4-D may cause corn root malformation with symptoms of stunting, increased number of roots, fusing of roots, and roots growing upward rather than downward. Banvel may cause similar symptoms.

7. 2,4-D, postemergence from "tassel" to "dough" stage – Postemergence application of 2,4-D during the period from tassel to dough may result in lack of kernel set or development. Avoid application of 2,4-D during the critical tassel-to-dough stage of corn development.

8. Dicamba, postemergence near tassel – Postemergence applications of dicamba (Banvel) near tassel stage may also result in lack of kernel set or development. Injury is similar to that caused by 2,4-D applied at the tassel to dough stage of corn development (No. 7).

9. Linuron, directed postemergence – Postemergence applications of linuron (Lorox) and ametryn (Evik) should be carefully directed on the weeds and kept off of the corn as much as possible. Plant tissue contacted by these chemicals rapidly wilts and becomes necrotic.

10. Paraquat drift injury – Paraquat is a nonselective contact herbicide generally used for foliage "knockdown" in reduced tillage cropping systems. Injury to crop plants occurs in the form of necrotic spots wherever spray drift contacts the leaf.

11. Glyphosate, spot treatment – Glyphosate (Roundup) is a nonselective systemic herbicide used for spot treatment of problem weeds in field crops. Injury to crop plants occurs as a slow yellowing or chlorosis, followed by wilting and plant necrosis.

12. Dinitroanaline carryover – Soil residues of dinitroanaline herbicides may cause corn seedlings to develop proliferated, stubby root systems. This can result in stunted purple plants that appear to be suffering from insufficient moisture and phosphorous deficiency. Dry, cool soils, or nematodes may also cause similar symptoms.

Photo credits: Joe Paul Downs, Michael D. K. Owen, Ellery L. Knake, Marshal D. McGlamery; University of Illinois at Urbana-Champaign, Extension Agronomists.

Subject Matter: Joe Paul Downs, University of Illinois at Urbana-Champaign, Extension Agronomist, Review by Marshal D. McGlamery, Agronomy Dept., University of Illinois at Urbana-Champaign.

Graphic Design: Martha Martin.

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Planting Date, Starter Fertilizer, and Corn Yield

W. M. WALKER and D. L. MULVANEY

AN ADEQUATE QUANTITY of fertilizer, along with early planting of an adapted variety, has long been recognized as important in producing high corn yields. Under some conditions, "starter" fertilizer is applied to corn to promote rapid plant growth. Several years ago producers were urged to use "popup" fertilizer at seeding to supply the developing seedling with nutrients.

During the past few years we have been doing research at the Agronomy Research Center in DeKalb County to measure the effects of popup and starter applications, nitrogen rate, and planting date on corn yield. This report summarizes part of our findings.

Planting dates

Four planting dates were selected for evaluation. The earliest were from the latter part of April to May 2 and the latest from May 22 to June 15. Because of weather conditions we were unable to begin planting on the exact same date each year. Therefore for convenience the dates are indexed as early, moderately early, moderately late, and late.

Within any given year, the early or late designation reflects not only a calendar date, but also weather conditions as they affected the time of planting. Commercial producers face the identical need for adjusting planting date because of adverse weather.

Fertilizer rates

Nitrogen rates varied from zero to 240 pounds per acre. The rate for the starter fertilizer, 8-32-16 (N-P_2O_5-K_2O), was 150 pounds per acre, and 33 pounds for the popup fertilizer, also 8-32-16. The starter was applied to the side and about 2 inches below the seed. The popup was applied with the seed.

Phosphorus and potassium levels in the experimental plots were maintained by broadcasting the appropriate fertilizer before planting. Soil tests averaged 6.7 for pH, 34 pounds per acre for available phosphorus, and 282 pounds per acre for exchangeable potassium.

Yields

Yields, as affected by nitrogen rate and starter fertilizer, were averaged for six years (Table 1). At the lower nitrogen rates there was a small yield increase attributable to the starter fertilizer. At the higher rates the increase was negligible.

Some researchers have suggested that starter fertilizers may be more effective at an early planting date when the soil is cool than later when the soil is warmer. In cool soils the rate of root growth is slower than in warm soils, and nutrient uptake may be restricted. Placing nutrients near the seedling might therefore be an advantage.

Average yields resulting from the use of starter fertilizer applied at various planting dates are presented in Table 2. Although there was a small yield response of about 2 bushels per acre with the starter, our results do not show a significant interaction between planting date and starter fertilizer.

The effect of planting date and nitrogen rate on average corn yields is illustrated in Table 3. As planting date was delayed, the yield response to nitrogen fertilizer decreased. At the latest date, the response was negligible beyond the 80-pound rate.

At the early and moderately early dates, however, yields did respond to the highest nitrogen rates. This finding reinforces the longstanding recommendation of Illinois agronomists that higher rates of nitrogen be used for corn planted early in the season.

Yield increases from applications of popup fertilizer often receive considerable publicity. But our results from DeKalb have shown inconsistent responses. Although yields varied from year to year, the average over three years was 149 bushels per acre both for plots with and those without popup fertilizer. It may be worthwhile north of Illinois, but our results do not support a recommendation for this state.

Results from this study show that early-planted corn responds better to higher nitrogen rates than does late-planted corn. At the higher nitrogen rates, neither starter nor popup fertilizer had any significant effect upon yield.

Table 1. — Effect of Starter Fertilizer and Nitrogen Rate on Corn Yields

N, lb/A	No starter	Starter
	bu/A	
0	122	128
80	148	150
160	158	159
240	160	160

Table 2. — Effect of Starter Fertilizer and Planting Date on Corn Yields

Planting date	No starter	Starter
	bu/A	
Early	152	155
Moderately early	156	157
Moderately late	151	153
Late	131	133

Table 3. — Effect of Nitrogen Rate and Planting Date on Corn Yields

N, lb/A	Early	Moderately early	Moderately late	Late
		bu/A		
0	126	129	131	116
80	153	157	153	134
160	166	169	161	138
240	169	172	162	139

W. M. Walker is professor of biometry and soil fertility; D. L. Mulvaney is agronomist in the Department of Agronomy.

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STUDENT WORKSHEET 1

IDENTIFICATION OF PARTS OF THE CORN SEED AND PLANT

1. Explain the functions of the parts of the corn seed listed below:

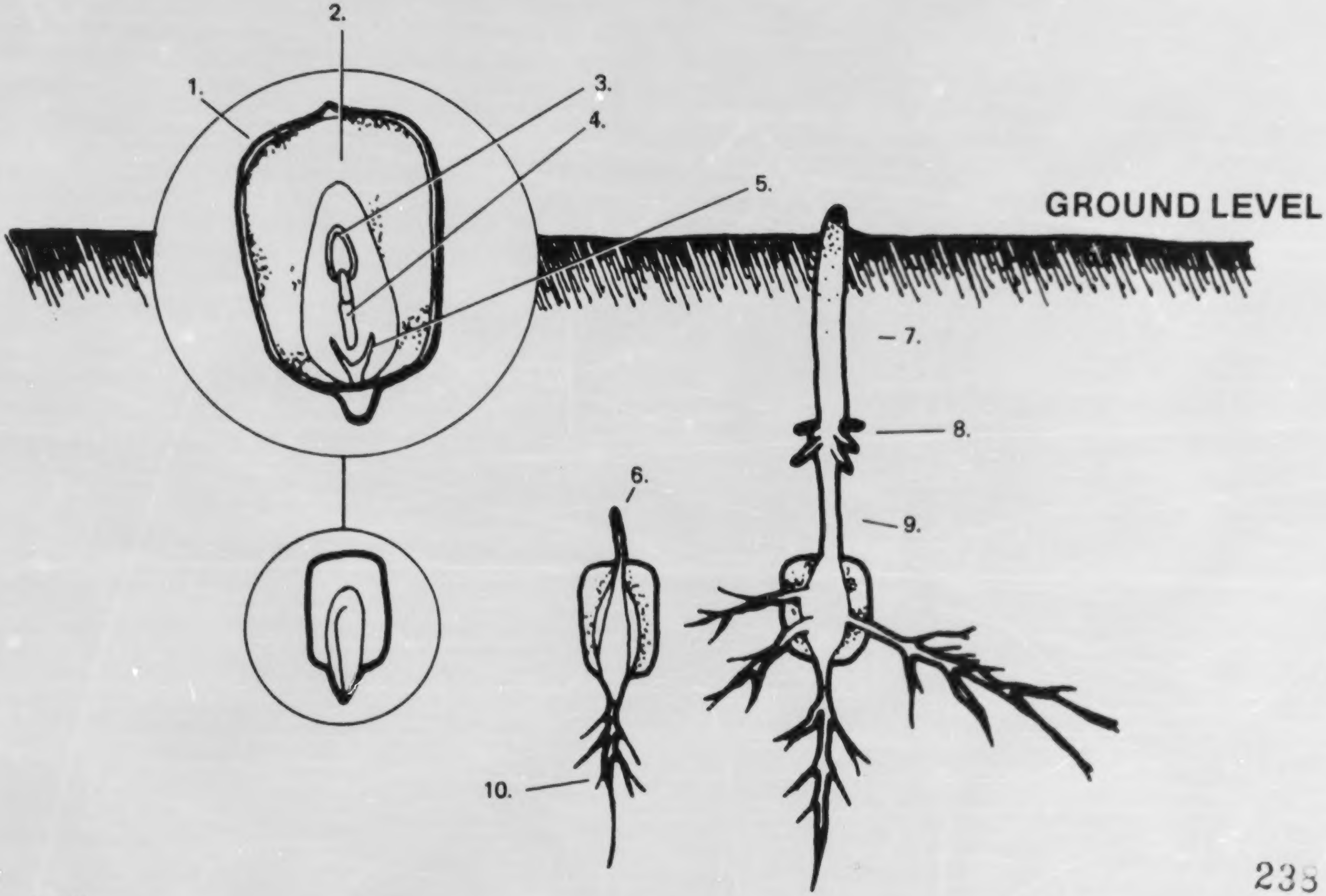
   a. Seed coat (hull) –

   b. Endosperm –

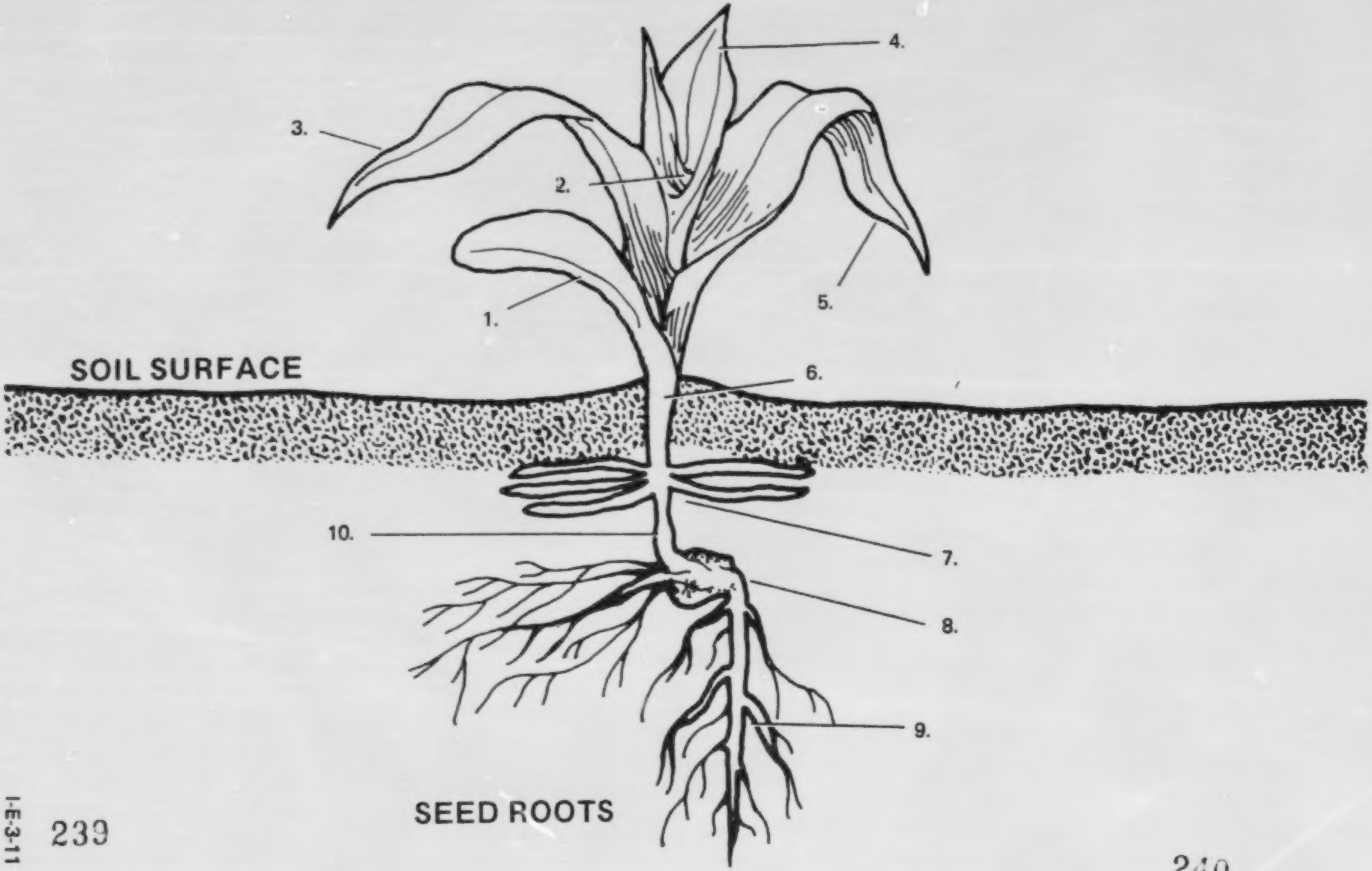
   c. Embryo –

2. Identify the parts of the corn seed and plant on the following pages:

GERMINATION OF A MONOCOT SEED



THE YOUNG CORN PLANT



STUDENT WORKSHEET 2

PREPARING THE SEEDBED AND SELECTING A VARIETY OF CORN

1. What are the characteristics of a good seedbed for corn?

2. What are the objectives of primary tillage in growing corn?

3. What are the disadvantages of leaving residue on the surface?

4. List five objectives of minimum tillage

    a.

    b.

    c.

    d.

    e.

5. What are the advantages of planting corn early?

6. What is the optimum planting date for your region in Illinois?

7. What factors determine this optimum date?

8. What is a "growing degree day"?

9. What is the mean growing degree days for your region in Illinois?

10. *What factors should be considered when selecting a variety of seed corn?*

11. Where can you obtain information on seed corn varieties?

12. Identify some brands of seed corn grown in your area.

Brand	G.D.D. Required for Maturity	Characteristics of Brand i.e., standability, yield, lodging, etc.

STUDENT WORKSHEET 3

PLANTING AND GROWING CORN

1. Describe "calendarization" of the corn crop.

2. Would the earliest maturing (short season) varieties be planted first or last? Why?

3. State some rules-of-thumb for planting depth of corn.

4. What are the planting populations for corn in your community? What factors are considered in deciding the planting population?

5. What are the advantages and disadvantages of drilling corn and hill dropping corn?

   Drill:

   Hill Drop:

6. How and when is nitrogen fertilizer applied to the corn crop in your community?

   How much should be applied per acre?

7. When, how and what quantity of phosphate and potash is applied to corn in your community.

8. What factors determine the amount of fertilizer to apply to the corn crop?

STUDENT JOB SHEET 1

PLANTING CORN FOR CLASSROOM DEMONSTRATIONS

Objectives:

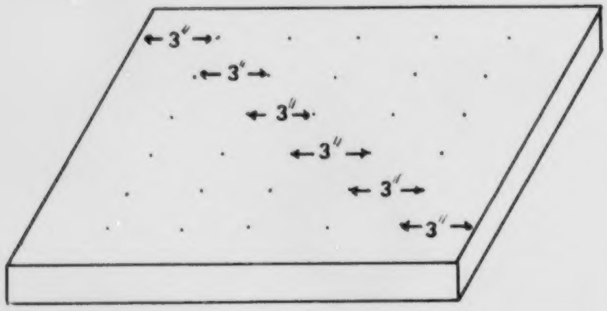
1. To understand how planting depth affects germination.
2. To become familiar with the parts of a young corn plant.
3. To determine the effects of various herbicides on the corn plant.

Materials:

1. Growing flat approximately 12" W x 18" L x 5" D.
   (Can construct a growing flat by using VAS Unit 3052, Constructing a Woodworking Project and the plans in Core I problem area: Developing Basic Carpentry Skills.)
2. Growing media.
3. Corn seed.

Procedures:

1. Place ½" of soil or growing media in the flat and plant one row of corn seed. (Plant same number of seeds in each row.)
2. Add 1" of soil or growing media and plant a second row of corn.
3. Add 1" of soil or growing media – plant a third row of corn.
4. Continue planting sequence until the last row is planted ½" deep.



5. Tightly pack the soil on ½ of each row.
6. Have students care for flat and keep a daily record of the germination rate and time per row, and the growth and development of the plants. The students should also identify any weeds germinating in the flat.

Questions:

1. Which row had the highest germination rate?
2. Which row germinated first? ______________________ Last? ______________________
3. What effect did the packing of the soil have on germination time? ____________________

   On % germination? ____

   Why? ____

4. What happened to the cotyledons? ________________________________

   ______________________________ Why? ______________________________

   ____

Observation: Record the following information:

1. Time of germination per row.
2. Time of germination on packed and unpacked rows.
3. Characteristics of first leaves to appear (sketch plant).
4. Characteristics of plant from germination through Stage 1.

Conclusions:

Discuss the results as they would apply to planting corn in the field on your S.O.E. project (approved practices).

STUDENT JOB SHEET 2

DETERMINING HERBICIDE EFFECTS ON CORN

Objectives:

1. To determine how herbicides can injure corn plants.
2. To be able to recognize and describe the various herbicide injuries.
3. To understand the proper safety procedures to follow in using and handling herbicides.

Materials:

1. Corn plants in a growing flat.
2. Mixtures of various herbicides — grass and broadleaf.
3. Eyedropper for each herbicide.
4. Following references from Vocational Agriculture Service, University of Illinois:
    a. Agronomy Handbook
    b. Corn Herbicide Injury Sheets I and II
    c. Corn Problem Series I, Planting to Knee High, and II, Knee High to Tasseling
5. Labels for each herbicide used

Procedures:

1. Using one herbicide per plant, place three drops of each herbicide on the growing point and three drops on one leaf of a corn plant.
2. Observe and record the effects of each brand of herbicide on the plants daily.
3. Record the safety procedures printed on the labels of each herbicide used.

Questions:

1. What was the effect of placing the herbicide on the growing point? ____________________

    ____

    On the leaf? ____

    ____

2. How long did it take for the effects to start? ______________________

    ____

3. Did all herbicides cause injury? ______________________________

Why? Why not? ______________________________

4. What is the proper way to handle herbicides? ______________________________

____

____

Observations:

Record daily observations

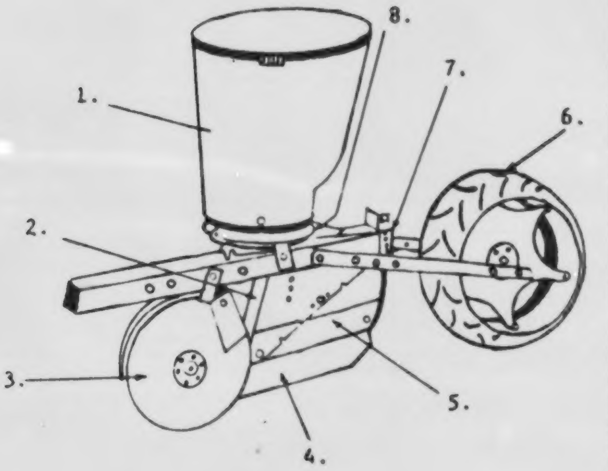
Conclusions:

Discuss the results as they would apply to selecting and using herbicides in the field on your S.O.E. project.
(approved practices)

JOB SHEET 3

DEPARTMENT OF AGRICULTURAL ENGINEERING
IOWA STATE UNIVERSITY
AM 18-72

ROW CROP PLANTER UNIT



Operation Teaches (Ability to . . . .
(Understanding of . . . .

1. U. Types of planter units.
2. U. Function of planter unit components.
3. U. Adjustments and maintenance of planter units.
4. A. Change unit from hill drop to drill planting.
5. A. Adjust row crop planter unit.

Materials Needed

1. Row crop planter or single planting unit.
2. Operator's manual for planting unit available.

Evaluation Score Sheet

	Item	Points	
		Possible	Earned
1.	Parts identification	16	____
2.	Function of parts	16	____
3.	Question 3–7	20	____
4.	Maintenance of planting unit	10	____
5.	Description and adjustment of type of planting	25	____
6.	Attitude and work habits	13	____
	Total	100	____

Developed by H. Edward Breece, Chairman, Department of Agriculture, Western Illinois University, Macomb, Illinois.

Part Identification	Function
1. ____________	____________
2. ____________	____________
3. ____________	____________
4. ____________	____________
5. ____________	____________
6. ____________	____________
7. ____________	____________
8. ____________	____________

Operational Procedure

1. Complete part identification section.
2. Write the major function on the line beside the part identified.
3. How is planting depth adjusted? ____________
4. How is row spacing changed? ____________
5. Row crop planters may be classified as to plate type and plateless. Which type planter unit do you have available for study? ________
6. Planters may also be classified as to how the planting mechanism is driven, carrying wheel drive or press wheel drive. Which type drive does you planter have? ____________
7. How does changing from a 16 to a 24-cell seed plate increase planting rate? ________
8. Is the planting unit available now set for drill or hill drop planting? ____________
9. How should the planter unit be maintained?
10. How is the unit changed from (hill drop to drill) or (drill to hill drop) type planting?
11. Change the planting unit available from hill drop to drill planting (or from drill to hill drop planting) following the instructions in the operator's manual.

Name ______________________________

Date ______________________________ Grade ____

NOTES

TEACHER'S KEY
STUDENT WORKSHEET 1

IDENTIFICATION OF PARTS OF THE CORN SEED AND PLANT

1. Explain the functions of the parts of the corn seed listed below:

   a. Seed coat (hull) –

      Protects embryo from insects and diseases.

   b. Endosperm –

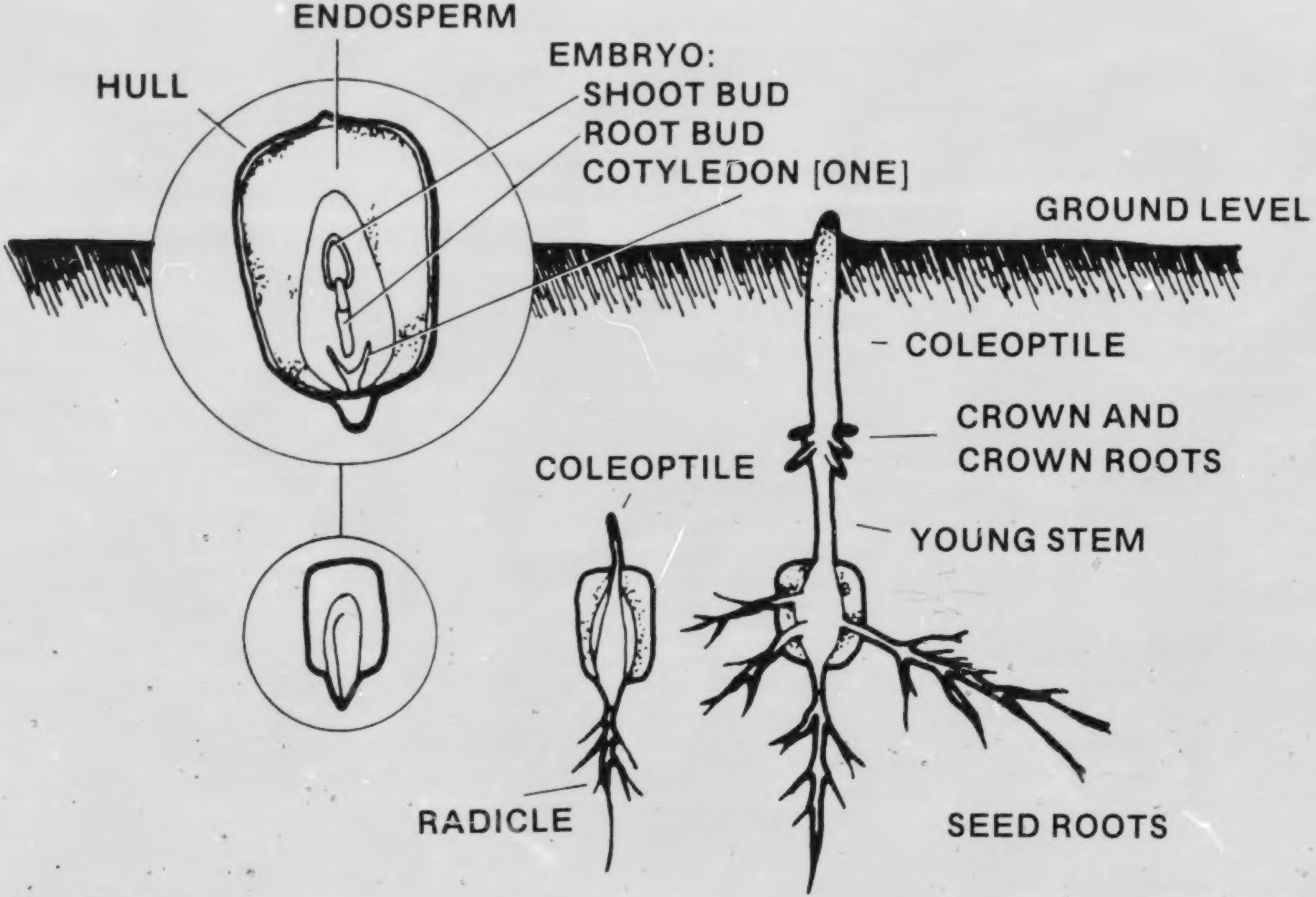
      Provides food for young plant

   c. Embryo –

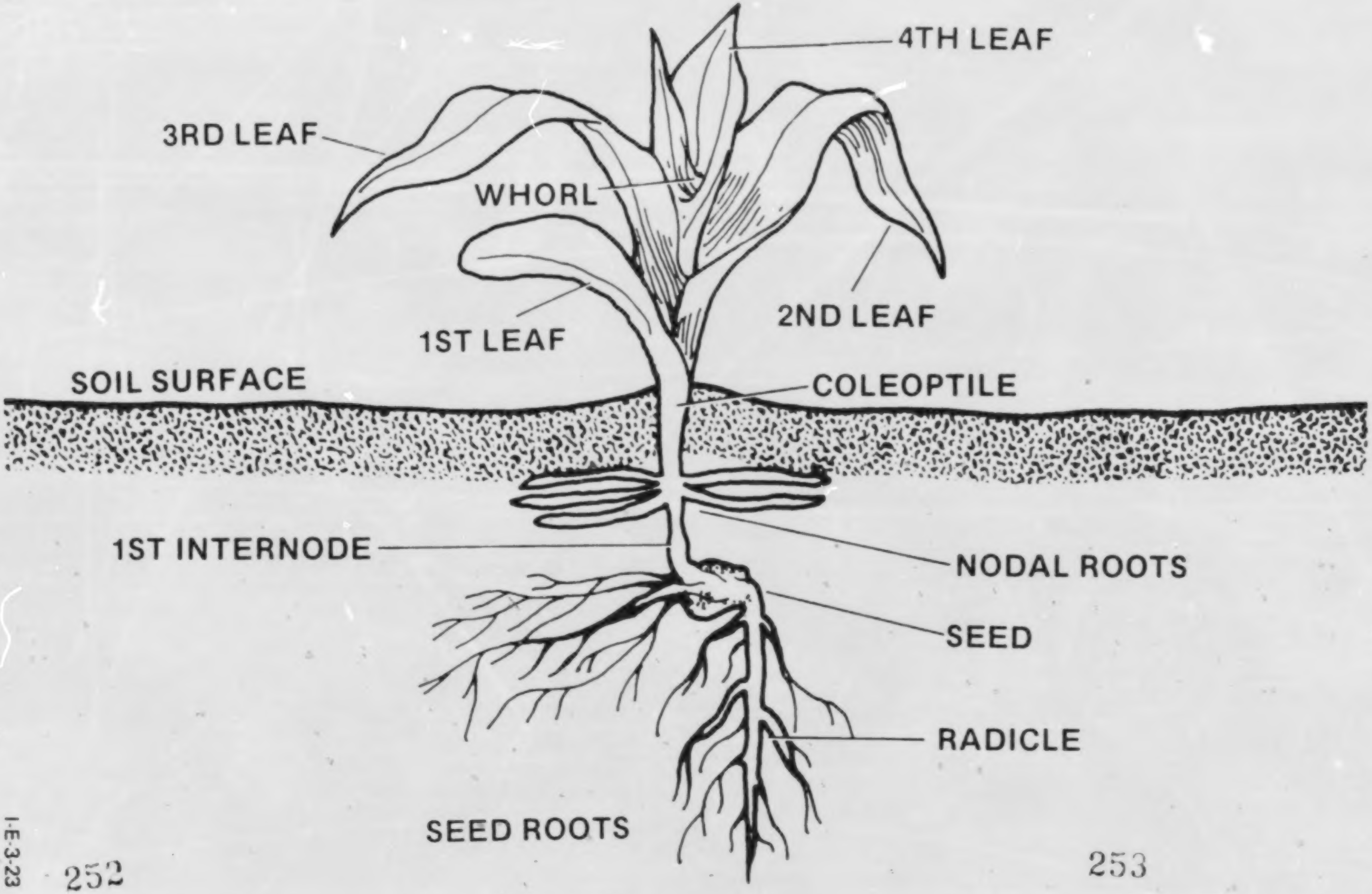
      Young immature plant

2. Identify the parts of the corn seed and plant on the following pages:

GERMINATION OF A MONOCOT SEED



THE YOUNG CORN PLANT



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TEACHER'S KEY
STUDENT WORKSHEET 2

PREPARING THE SEEDBED AND SELECTING A VARIETY OF CORN

1. What are the characteristics of a good seedbed for corn?

   Warm, moist, well supplied with air, only fine enough to give contact between seed and soil.

2. What are the objectives of primary tillage in growing corn?

   a. break sod
   b. turn under trash
   c. kill weeds
   d. loosen plow layer

3. What are the disadvantages of leaving residue on the surface?

   a. delays soil warm-up in spring
   b. may interfere with cultivation
   c. may make herbicides less effective

4. List five objectives of minimum tillage

   a. save dollars – reduce trips over field
   b. increase soil permeability
   c. reduce soil packing
   d. reduce annual weeds
   e. conserve soil

5. What are the advantages of planting corn early?

   a. higher yield potential
   b. tassel and silk ahead of dry weather
   c. deeper root system
   d. greater use of solar energy
   e. shorter, lower ear height
   f. less drying at harvest
   g. greater choice of hybrids

6. What is the optimum planting date for your region in Illinois?

7. What factors determine this optimum date?

   a. soil temperature when planting early
   b. calendar – normal planting date

8. What is a "growing degree day"?

   Number of "heat units" – the mean (average) temperature during growing season.

9. What is the mean growing degree days for your region of Illinois?

10. What factors should be considered when selecting a variety of seed corn?

   a. maturity
   b. yield
   c. standability
   d. disease resistance
   e. adaptability

11. Where can you obtain information on seed corn varieties?

   a. seed dealer
   b. county agent
   c. vo-ag teacher
   d. state researchers
   e. own experience

12. Identify some brands of seed corn grown in your area.

Brand	G.D.D. Required for Maturity	Characteristics of Brand i.e., standability, yield, lodging, etc.

TEACHER'S KEY
STUDENT WORKSHEET 3

PLANTING AND GROWING CORN

1. Describe "calendarization" of the corn crop.

   A planned scheduling of planting dates according to maturity.

2. Would the earliest maturing (short season) varieties be planted first or last? Why?

   Earliest maturing are planted first and full season hybrids planted last.
   – Insures wide spread of pollination and harvesting.

3. State some rules-of-thumb for planting depth of corn.

   Average 2" deep.
   Earlier planting time – ½" to 1" shallower.
   Dry soil plant 1" to 2" deeper.
   Deep enough for moisture.

4. What are the planting populations for corn in your community? What factors are considered in deciding the planting population?

5. What are the advantages and disadvantages of drilling corn and hill dropping corn?

Drill:	Uniform distribution – efficient use of light, water, and fertilizer. – Suckers and lodges easier.
Hill Drop:	Better standability less suckers or tillers. Not as efficient in use of light, water, and fertilizer.

6. How and when is nitrgoren fertilizer applied to the corn crop in your community?

   How much should be applied per acre?

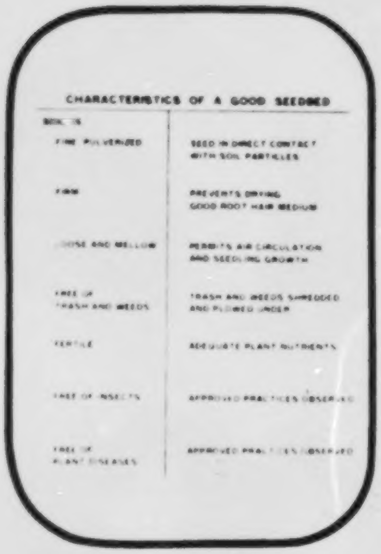
7. When, how and what quantity of phosphate and potash is applied to corn in your community.

8. What factors determine the amount of fertilizer to apply to the corn crop?

   a. Cost of fertilizer.
   b. Expected yield response.
   c. Expected price of crop.
   d. Fertility level of soil.
   e. Unwanted environmental effects.
   f. Unwise use of fertilizer reserves.

TRANSPARENCIES AND DISCUSSION GUIDE

GROWING CORN



CHARACTERISTICS OF A GOOD SEEDBED

SOIL IS

FINE PULVERIZED	SEED IN DIRECT CONTACT WITH SOIL PARTICLES
FIRM	PREVENTS DRYING GOOD ROOT HAIR MEDIUM
LOOSE AND MELLOW	PERMITS AIR CIRCULATION AND SEEDLING GROWTH
FREE OF TRASH AND WEEDS	TRASH AND WEEDS SHREDDED AND PLOWED UNDER
FERTILE	ADEQUATE PLANT NUTRIENTS
FREE OF INSECTS	APPROVED PRACTICES OBSERVED
FREE OF PLANT DISEASES	APPROVED PRACTICES OBSERVED

1. When getting ready to plant soybeans, seedbed preparation is an important first step.

The soil should be finely pulverized, yet maintain a porous characteristic. The seed must be in direct contact with the soil particles in order to receive adequate soil moisture.

The soil should be firm enough to prevent rapid drying and furnish a good medium for tiny root hairs.

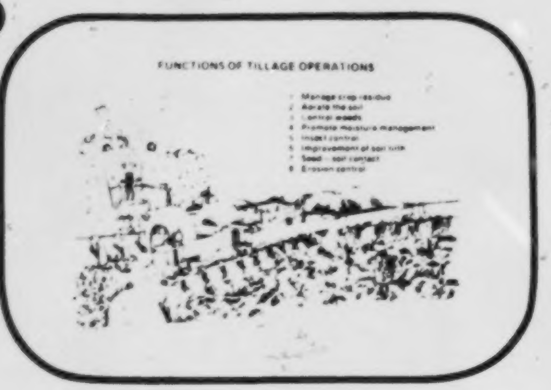
The soil should be loose and mellow, especially the upper two or three inches. Loose soil will permit better air circulation and seedling growth.

The soil should be free of trash and growing vegetation. Trash and weeds should be cut into fine pieces and plowed under.

The soil should be fertile in the seedbed in order that the young soybean plant will have adequate plant nutrients for fast growth.

The soil should be free of insects. Crop rotation, use of insecticides, shredding of stalks and weeds, and fall plowing will help free the soil of insects.

The soil should be free of diseases. Crop rotation, fall plowing, and the use of fungicides help eliminate disease problems.



FUNCTIONS OF TILLAGE OPERATIONS

1. Manage crop residue
2. Aerate the soil
3. Control weeds
4. Promote moisture management
5. Insect control
6. Improvement of soil tilth
7. Seed – soil contact
8. Erosion control

2. Therefore, the functions of tillage are:

   1. To manage crop residue.
   2. To aerate the soil.
   3. To control weeds.
   4. To promote moisture management.
   5. To control insects.
   6. To improve soil tilth.
   7. To provide for seed-soil contact, and
   8. To control erosion.

IMPLEMENTS IN PRIMARY TILLAGE

1. Moldboard, disk, and chisel plows
2. Subsoilers
3. Listers
4. Disk tillers
5. Offset or heavy tandem disks
6. Rotary tillers

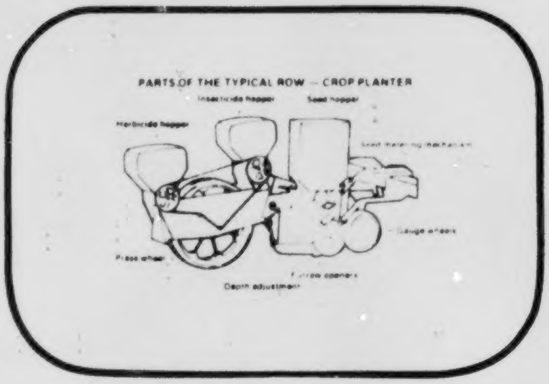
3. There are two major types of tillage methods: primary and secondary.

Primary tillage cuts and shatters soil and may bury trash. It usually leaves the surface rough. Implements usually used for primary tillage include: moldboard, disk, and chisel plows; subsoilers; listers; disk tillers; offset or heavy tandem disks; and rotary tillers.

4. Secondary tillage works the soil to shallower depth, pulverizes and firms the soil, closes air pockets, kills weeds, and helps conserve moisture. Implements used include: disks, spring-tooth harrows, field cultivators, rod weeders, cultipackers, disk tillers, rotary hoes, and row-crop cultivators.

Following is a review of some of the more common implements used in seedbed preparation.

5. Planters are designed to plant large numbers of crops in different conditions. Here are just a few typical components of the row-crop planter:



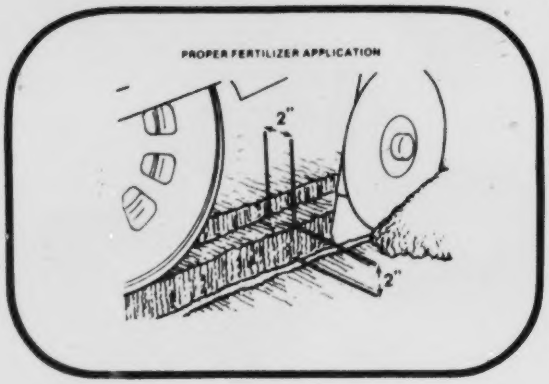
Drives — To obtain the correct spacing of seeds in the row at varying travel speeds and under varying soil conditions, the planting unit drive mechanism is keyed to the forward travel of the planter. This is done by a ground-driven wheel to turn the seeding mechanism.

Furrow openers — The major function of the furrow opener is to open a well-defined groove in the soil where the seed may be placed at the proper depth.

Seed metering mechanism — The function of the seed metering mechanism is to select the seeds from the hopper. The seed metering system selects the seeds and carries them to the seed placing mechanism.

Seed depth control device — This device ensures that all seeds are planted at the same depth. Since the seedbed is never perfectly flat and soils vary as to firmness, some type of gauging or depth device is needed.

Press wheels — The press wheel firms the soil around the seed to obtain good seed-to-soil contact. This same wheel is often used to gauge the depth of planting.



6. Row applications of fertilizers in soybeans are more risky than in corn because of the salt injury that occurs when high rates of fertilizer are applied near the seed.

If injured, the seedling will be stunted and show early yellowing. To avoid injury, the application should be, as shown, about 2 inches away from the seed and below the seed.

Other methods of application are broadcasting and plowing down or disking in of required phosphorous and potassium (P & K) prior to planting.

TEACHER'S KEY
SAMPLE TEST QUESTIONS

GROWING CORN

True or False

+ 1. Planting corn early pays off with higher yields.

0 2. Early hybrids will outyield full-season hybrids.

+ 3. Fall plowing generally allows you to plant earlier in the spring.

0 4. Most corn today is planted in 40" rows.

+ 5. The endosperm is the main energy reserve of the kernel.

+ 6. The tassel is the male flowering part of the corn plant.

+ 7. The corn ear is the female flowering part of the corn plant.

0 8. Corn grows best when nights are hot.

+ 9. The maturity of corn is dependent upon the number of "growing degree days."

+ 10. Early planted corn will be shorter than late planted corn.

Completion

11. The best months to plant corn are April and May.

12. The recommended planting population for corn is around 20 – 25,000 seeds/acre.

13. For planting corn, the soil temperature should be around 55 degrees at planting depth.

14. Two sources of information on seed corn are dealers and University research data

15. The major nutrients to be concerned about in corn production are nitrogen, phosphorus, and potassium.

Essay (Answers will depend on class discussion and conclusions)

16. What is the difference between hill-dropped and drilled corn?

Which is used in our area?

17. What is the goal of any method of good tillage?

18. Discuss the factors which influence the decision to convert to narrow row corn.

19. What factors are considered in determining the planting depth of corn?

20. Which tillage method (conventional, minimum or zero-till) would you use to plant corn?

    Why?

    What factors are to be considered?

21. What factors should be considered when selecting a variety of corn?

22. What are some common problems that can occur during the growing season of corn?

23. Draw a corn seed and identify the following: (hull, endosperm, and embryo)

24. Draw a corn plant and identify the following: (radicle, coleoptile, seed, and whorl)

25. Describe how you would control the following pests in your corn field; consider time of application and methods.

    a. Weeds

    b. Insects

UNIT E: CROP SCIENCE

PROBLEM AREA: GROWING SOYBEANS

SUGGESTIONS TO THE TEACHER:

This problem area is designed for use with ninth grade or beginning students enrolled in an agricultural occupations program. The recommended time for teaching this problem area is spring prior to soybean planting. The estimated time for teaching this problem area is 5 to 10 days depending on how much time the teacher wishes to spend on discussion and conducting the suggested exercises. The materials in this problem area were selected and written with the following assumptions:

1. Soybeans are a major Illinois crop and it is important for students in agriculture to have a basic understanding of soybean production.
2. It is important for students to become familiar with the local practices used in soybean production.

The instructor is encouraged to conduct a local search to locate other supplementary materials. The items in this problem area are for reference or modification as the teacher adapts these materials to his/her local situation.

CREDIT SOURCES:

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The teacher's guide, student worksheets, student job sheets, and sample test questions were developed by Jerry Pepple, Department of Vocational and Technical Education, University of Illinois. The transparency masters and transparency discussion guide were adapted by Vocational Agriculture Service, University of Illinois. Suggestions and guidance in the development of these materials were provided by the Rural Core Curriculum Pilot Test Teachers.

TEACHER'S GUIDE

I. Unit: Crop production

II. Problem area: Growing soybeans

III. Objectives: At the close of this problem area the student will be able to:

1. Describe the characteristics of a good seedbed for soybeans.
2. Describe the functions of the implements used to prepare the seedbed for soybeans.
3. List the factors to consider in selecting a variety of soybeans.
4. Explain the most recent research findings pertaining to time of planting, depth of planting, width of rows, spacing within the row, and method of planting soybeans.
5. Understand the importance of fertilizer to the soybean crop.
6. List the major problem of growing soybeans from planting to emergence, emergence to flowering.
7. Describe the recommended cultural and chemical practices used to control weeds, diseases, and insects in soybeans.

IV. Suggested interest approaches:

1. Compile data pertaining to soybean acreage and yields from census data, federal and state agricultural reports. Using the data collected, have each student develop realistic goals for soybean production in the community. Ask students to indicate what problems will be encountered in achieving their goals.
2. Make a display of recommended varieties of soybeans grown in the community.
3. Make a display of plant specimens illustrating a normal plant, disease damage, insect damage and plant food deficiencies.
4. At planting time, conduct a field trip to a student's farm who has a soybean project.
5. Show a film on the latest research on the development of new varieties of soybeans.

V. Anticipated problems and concerns of students:

1. What yields should be expected in the community? What problems are likely to be encountered in obtaining these yield goals?
2. Why is an understanding of the soybean plant development necessary for an agriculturalist concerned with soybean production?
3. What are the parts of a soybean plant?
4. What are the stages of growth for a soybean plant?
5. What are the significant characteristics of the root of the soybean plant?

6. What factors should be considered in selecting a variety of soybeans?

7. What are the recommended varieties of soybean for the community?

8. What causes one variety to mature earlier than another?

9. Where can I obtain good quality soybean seed?

10. Why should soybean seed be tested for germination before planting?

11. What precautions should be followed during handling to prevent injury to soybean seed?

12. How important are each of the major nutrients (N, P and K) in the production of soybeans?

13. Is it necessary to fertilize soybeans following corn?

14. Where and when in the cropping plan should the recommended fertilizer be applied?

15. What are the characteristics of a good soybean seedbed?

16. What tillage practices are used to prepare seedbeds?

17. What equipment is needed for soybean production?

18. What are the most recent research findings pertaining to:

    a. Time of planting
    b. Depth of planting
    c. Width of rows
    d. Spacing within the row or planting population
    e. Method of planting

19. What weeds and grasses are of major concern in the production of soybeans in the community?

20. What practices are used to control weeds and grasses?

21. What precautions should be followed when using pesticides?

22. What diseases and insects are causing significant damage to soybeans in the community?

23. What practices should be followed to control the diseases and insects in soybeans?

24. What are the major problems in growing soybeans?

VI. Suggested learning activities and experiences:

1. List the problems and concerns raised by students in the class on the chalkboard. Decide on a tentative order in which the problems and questions will be studied. Answer and discuss those questions which can be answered by the students in the class.

2. Use colored slides or transparencies to show and identify the stages of growth and parts of the soybean plant.

3. Distribute Worksheet 1, "Identification of Parts of the Soybean Seed and Plant." Discuss the importance of understanding the names and functions of the parts of the soybean seed and plant.

4. Direct students in preparing a "growth calendar" to show the time of year soybean plants normally pass through each growth stage.

5. Secure soybean seeds and conduct germination tests.

6. Plant soybeans at various depths and spacing in a flat in the classroom to observe time required for germination and growth and development. Use Job Sheet 1, "Planting Soybeans for Classroom Demonstrations."

7. Arrange for a local implement dealer or farmer to demonstrate the calibration of a planter or grain drill for planting.

8. Have available samples of pesticides used to control pests in soybeans. Secure and study labels from different herbicides and insecticides. Stress the safe use and handling of chemicals.

9. Place different herbicides on the soybean plants growing in the flats to observe the effects. Have students keep notes on the effects herbicides have on various weeds and soybeans in the flats. Use Job Sheet 2.

10. Show flash cards or slides of soybean plants with disease and insect damage. Secure and mount pictures of various cultural practices used in controlling soybean diseases and insects.

11. Hand out Worksheet 2, "Preparing the Seedbed and Selecting a Variety." Distribute VAS Unit 4033a for student reference. A supplementary reference would be "Modern Soybean Production."

12. Hand out Worksheet 3, "Planting and Growing Soybeans." Use VAS Unit 4033a and VAS Unit 4057 for reference.

13. Show and discuss the slidefilm series on soybean problems.

14. Use the selected transparencies and discussion guide for additional information and discussion on selecting varieties, planting practices, and problems during the soybean growing season.

VII. Suggestions for using this problem area:

1. The main purpose of this problem area is to introduce the students to approved and recommended practices of soybean production for the S.O.E. projects.

2. This problem area should provide the students with a general knowledge and understanding of the importance of the soybean crop to Illinois and their community.

3. Students who have soybean projects should use approved practices which have been identified in class.

VIII. Evaluation:

1. Collect and grade Worksheets 1 – 3.

2. Evaluate the student's completeness of their notes concerning Job Sheets 1 and 2.

3. Administer and evaluate a test over the problem area.

IX. Reference and aids: (Available from Vocational Agriculture Service, University of Illinois, Urbana, IL except Modern Soybean Production text)

1. VAS Unit 4033a, Soybean Production
2. VAS Unit 4057, Common Problems of Soybeans
3. Selected Transparencies, Soybeans – Planting to Harvest
4. Slidefilm 751, Soybean Problems – Planting to Emergence
5. Slidefilm 752, Soybean Problems – Emergence to Flowering
6. Slidefilm 756, Soybean Disease Management
7. Slidefilm 755, Growing Soybeans in Narrow Rows
8. Agronomy Handbook, VAS or County Extension Adviser.
9. Picture Sheets – Soybean Diseases, Insects, and Herbicide Injury I and II
10. Pesticide Materials, labels, etc.
11. Modern Soybean Production, A & L Publications, Station A, Box F, Champaign, IL 61820

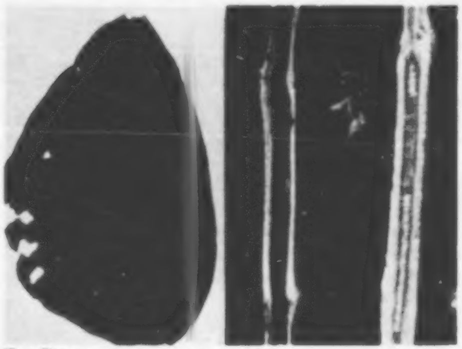
SOYBEAN DISEASES I

1. Pythium seedling rot

2. Rhizoctonia root rot

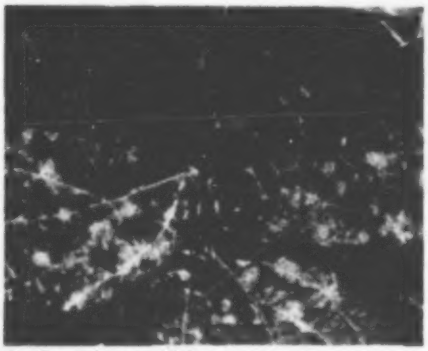
3. Soybean cyst nematode. L, field damage; R, cysts on roots

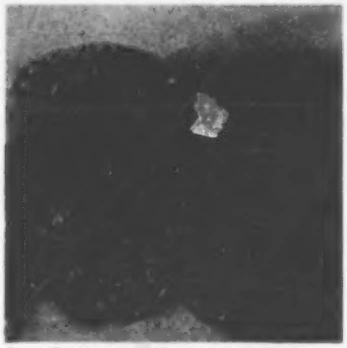
4. Phytophthora root and stem rot

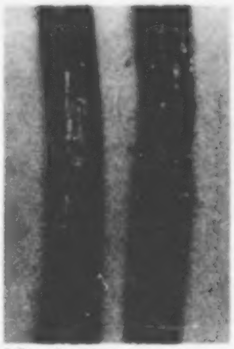

5. Brown stem rot

6. Charcoal rot

7. Purple seed stain


8. Powdery mildew


9. Septoria brown spot


10. Anthracnose

11. Stem canker

12. Pod and stem blight. L, pycnidia on stems and pod; R, infected seed

13. Downy mildew. L, upper and C, lower leaf surface; R, infected seed

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

PLANT DISEASE NO. 3
JANUARY 1980
URBANA, ILLINOIS

SOYBEAN DISEASES I

1. **Pythium Seedling Rot** is caused by several species of soil-borne fungi in the genus *Pythium*. Diseased plants may occur singly, in small circular patches--especially in low areas in the field--or uniformly over an entire field following a rainy period. Seedlings may rot before emergence. Plants that do emerge may wilt later, then turn brown and die. Pythium causes a soft watery rot. Damge is most severe in cold, wet soil. The fungi survive in soil and crop debris as oospores and mycelium.

2. **Rhizoctonia Root Rot** is caused by the common soil-borne fungus *Rhizoctonia solani*. Seedlings or somewhat older plants wilt and may die from a firm, dry, brown to reddish-brown decay of the roots and stem below or near the soil line. The fungus also causes pre- and post-emergence damping-off. Damage is most severe in heavy, poorly-drained soils where groups of affected plants commonly wilt and die in areas 4 to 10 feet in diameter. The *Rhizoctonia* fungus survives indefinitely in soil as mycelium and sclerotia.

3. **Soybean Cyst Nematode,** caused by *Heterodera glycines*, is a serious pest and major threat to soybean production. Severely infected plants are stunted and yellowed (chlorotic) and may die in areas of fields. Lightly infected plants appear normal, especially when growing conditions for soybeans are favorable. Pinhead-sized, shiny, white to yellow females or brown cysts (dead female bodies) are attached to the roots. The cysts are much smaller than the larger and loosely attached bacterial nodules. The dark brown cysts persist for years in the soil. The cysts are easily spread in even small bits of soil.

4. **Phytophthora Root and Stem Rot** is caused by the soil-borne fungus *Phytophthora megasperma* var. *sojae*. Affected plants turn yellow, wilt, wither and die at any age, leaving short to long gaps in rows. Seedlings may be attacked and die before or after emergence. A dark brown root rot can be found on older plants, with the dull brown discoloration extending up the stem into the lower branches. Phytophthora rot is most severe in low, poorly-drained, heavy clay soils following cool and rainy weather. The *Phytophthora* fungus survives in soil and buried crop debris as oospores or mycelum.

5. **Brown Stem Rot** is caused by the soil-borne fungus *Phialophora gregata* (synonym *Cephalosporium gregatum*). The disease usually becomes apparent about midseason by a dark reddish-brown discoloration inside the lower stem when the stem is split. The browning can be confused with that caused by other pathogens and should **not** be considered as diagnostic. Certain fungal strains cause the leaves to scorch between the veins, wither, and drop early. External symptoms are not observed on infected plants until pod set. The causal fungus survives in soybean debris as mycelium.

6. **Charcoal Rot** is caused by the fungus *Macrophomina phaseolina*. The disease appears in dry, hot weather or when plant growth is limited by some factor. Affected plants lack vigor and die early. Numerous black specks (sclerotia) appear when the "bark" is peeled from the stem base and roots giving diseased tissues a grayish-black color. Black streaks appear inside the roots and lower stem when the plant is split open. Sclerotia are frequently formed in the pithy area of the stem. The disease is most common in the southern half of the USA. The fungus survives as sclerotia in soil and the debris of many crops, including soybeans.

7. **Purple Seed Stain** is caused by the fungus *Cercospora kikuchii*. A pink or pale to dark purple coloration of the seedcoat is the most characteristic symptom. Diseased seed are often dull, cracked and rough. Small, inconspicuous, angular, reddish-brown spots form on the leaves, stems and pods. Infected seeds may reduce the stand or often produce diseased seedlings. The fungus survives in seed and crop debris as mycelium with infection favored by prolonged moist weather from pod set to harvest.

8. **Powdery Mildew** is caused by the fungus *Microsphaera diffusa*. Superficial, white to pale gray powdery patches form on the leaves. The soybean tissue underneath is reddened. Where the disease is severe, affected leaves wither and drop early. The mildew fungus is believed to survive in living leaves in the southern states. The disease is favored by warm dry days and cool nites.

9. **Septoria Brown Spot** or brown spot is caused by the fungus *Septoria glycines*. Small, angular to irregular, chocolate- to reddish-brown spots form on both surfaces of the leaves. The lower and older leaves gradually turn yellow and drop early. Black specks (pycnidia) form in the older lesions. In wet weather, infections progress from the lower to the upper leaves. Late in the growing season, infected leaves turn rusty-brown and drop early. The fungus survives as mycelium in crop debris and seed.

10. **Anthracnose** may be caused by two fungi, *Colletotrichum dematium* var. *truncata* and *Glomerella glycines*. The former fungus is much more common in the Midwest, infecting plants of all ages. *G. glycines* only infects older plants. Both fungi produce similar symptoms. Indefinite, enlarging, reddish- or dark-brown areas develop on the stems and pods. Later, these areas are covered with black fungal fruiting bodies (acervuli) that resemble tiny pin cushions containing black spines (setae) that are easily seen with a hand lens. Infected seed may be shriveled and moldy, or near normal in appearance. The anthracnose fungi survive as mycelium in crop debris and in seed.

11. **Stem Canker** is caused by the fungus *Diaporthe phaseolorum* var. *caulivora*. Dark, reddish-brown then tan, girdling cankers form in the stem at the base of a branch or leaf petiole, usually at the 4th or 5th nodes, starting about the beginning of pod set. Affected plants, which are usually scattered in a field, commonly wilt, wither and die early with the dead, dried leaves remaining attached. Small, reddish-brown lesions on the cotyledons may cause infected seedlings to wither and die. The fungus survives in crop debris and seed as mycelium.

12. **Pod and Stem Blight** is caused by the fungus *Diaporthe phaseolorum* var. *sojae*. Plants when near maturity develop large numbers of black specks, fungal fruiting bodies (pycnidia), in straight rows along the stems and scattered on dry, poorly developed pods. Heavily infected seed are dull, badly cracked, shriveled, and often covered partially or completely with a white mold growth. Sowing diseased seed commonly results in seed decay, seedling blights, and often a poor stand in the field. The fungus survives as mycelium in crop residues and seed.

13. **Downy Mildew** is caused by the fungus *Peronospora manshurica*. Indefinite, yellowish-green areas appear on the upper leaf surface. The lesions enlarge and turn a grayish-brown to dark brown surrounded by a yellow-green margin. The disease gets its name from the grayish to pale purple tufts of mold that form directly on the undersides of the leaf lesions in damp weather. If severe, some leaves wither and drop early. A whitish crust, composed of mycelium and oospores of the fungus, may form on infected seed. The fungus survives as thick-walled oospores in infected leaves and on the seed.

For chemical and cultural control suggestions, a listing of resistant varieties and other control measures, consult the Extension Plant Pathologist at your land-grant university, or your county extension office.

Photo credits: R. F. Nyvall (1, 7), G. W. Simone (2, 13L), University of Illinois (3, 4, 5R, 6, 8, 9, 11, 12L, 13L and R), J. M. Dunleavy (5L), T. M. Sjulin (10), R. W. Samson (12R), and K. L. Athow (13C).

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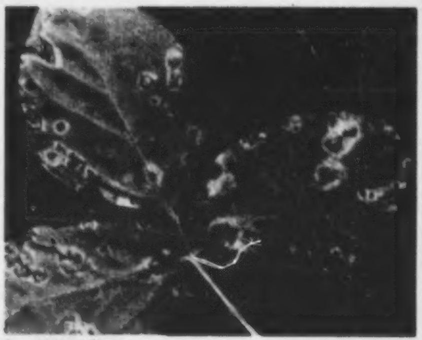
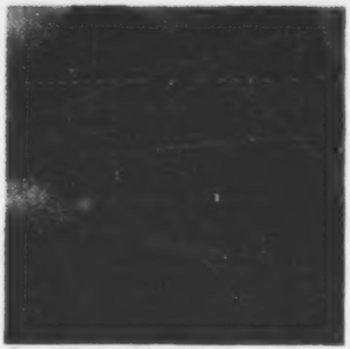
SOYBEAN DISEASES II

1. Bacterial blight

2. Bacterial pustule. R, close up of pustules

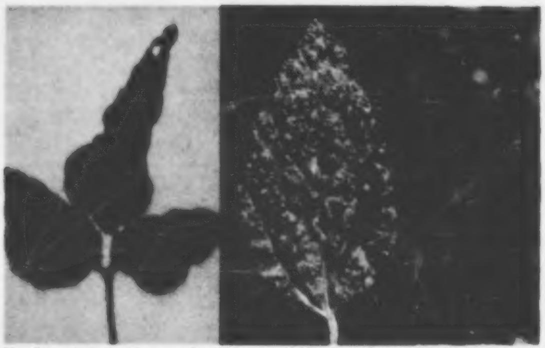

3. Wildfire


4. Alternaria leaf spot

5. Frogeye leaf spot

6. Phyllosticta leaf spot

7. Sclerotinia stem rot. L, cottony mycelium; R, sclerotia on stems


8. Soybean mosaic. L, and C, leaf symptoms; R, mottling of seed coats

9. Yellow mosaic

10. Bud blight. L, necrosis of terminal buds; R, blotches on pods

11. Lightning damage

12. Hail injury

13. Frost damage

14. Iron deficiency

15. Potassium deficiency

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

PLANT DISEASE NO. 4
JANUARY 1980
URBANA, ILLINOIS

SOYBEAN DISEASES II

1. **Bacterial Blight** is caused by the bacterium *Pseudomonas glycinea* (synonym *Pseudomonas syringae*). Leaf spots are small, angular and yellow, later turning dark brown to black, commonly **with** water-soaked margins, and bordered by a yellowish-green halo. The enlarging lesions may merge to form large, irregular dead areas. In windy and rainy weather, the centers of older lesions drop out or tear away with the leaves appearing ragged and shredded. The disease is common following cool wet weather up to about midseason. The bacterium survives in crop debris on or above the soil surface and in seed.

2. **Bacterial Pustule,** caused by the bacterium *Xanthomonas phaseoli* var. *sojensis*, develops during warm, wet weather. Small, angular, yellowish-green spots with dark, reddish-brown centers, **without** water-soaked margins, form on the leaves. The center of each lesion has a minute, raised pustule, especially on the lower surface. The lesions may merge to produce large, irregular dead areas. The dead tissue may rupture and tear away during windy and rainy weather. The bacterium survives in crop debris and seed.

3. **Wildfire** is caused by the bacterium *Pseudomonas tabaci*. The same organism causes a worldwide disease of tobacco. Light brown to dark brown or black spots with a **broad yellow halo**, up to 1.25 cm wide, appear on soybean leaves. The lesions may enlarge in damp weather and merge to kill large irregular areas that become dry and tear away. If severe, almost complete defoliation can occur. Wildfire almost always is found associated with Bacterial Pustule (2). The bacterium survives in crop debris and seed.

4. **Alternaria Leaf Spot** is caused by one or more species of fungi in the genus *Alternaria*. Dark brown, concentrically-ringed spots 0.8 to 2.5 cm in diameter, form on the leaves of plants as they near maturity. The lesions often enlarge and merge to kill large areas of leaves. Infected seed may show a dull brown discoloration. The *Alternaria* fungus survives as mycelium in crop residues and seed.

5. **Frogeye Leaf Spot**, caused by the fungus *Cercospora sojina*, is most common in the southern half of the USA in warm humid weather. The disease appears as small, irregular to angular, light gray to tan spots on the leaves with narrow, dark reddish-brown borders. Several lesions may merge to form large, irregular spots. Where severe, infected leaves may wither and drop early. Lesions also develop on the stems, pods and seed. The fungus overwinters as mycelium in crop refuse and seed.

6. **Phyllosticta Leaf Spot** is caused by the fungus *Phyllosticta sojaecola*. This minor disease commonly appears as pale-green, round to oval or V-shaped areas at the margins of the first few trifoliate leaves of young plants. The lesions soon dry, turn tan or a dull gray with a narrow, dark brown or purplish border. The lesions later tear and fall away. Numerous black specks, fungal fruiting bodies (pycnidia), form in the older lesions. The fungus survives as mycelium in crop refuse and seed.

7. **Sclerotinia Stem Rot** or white mold is caused by the soil-borne fungus *Sclerotinia (or Whetzelinia) sclerotiorum* var. *sojae*. The lower stems of affected plants are covered with a white cottony mold in prolonged moist weather. Small to large, black, round to irregular, fungal bodies (sclerotia) form in the cottony mold both outside and inside the stems, and occasionally within the pods. Diseased plants may die early with the wilted then withered leaves remaining attached for some time. The fungus may also cause a pre- and postemergence damping-off of soybean seedlings. The fungus survives for long periods as sclerotia in the soil and with the seed.

8. **Soybean Mosaic,** caused by the soybean mosaic virus, produces variable symptoms depending on the soybean cultivar and strain of the virus. Diseased plants are usually somewhat stunted with distorted (crinkled, puckered, ruffled, narrow, stunted) leaves. The symptoms are largely masked at temperatures above 85° to 88° F. The pods are often stunted, flattened, or curved and contain fewer and smaller seed. Certain virus strains cause a dark brown to black mottling of the seed coat. Infected seeds fail to germinate, or they produce diseased seedlings. The virus overseasons in living plants and is spread by the feeding of aphids and other insects and by sowing virus-infected seed.

9. **Yellow Mosaic** is caused by the bean yellow mosaic virus. Mixed infections of the virus with the soybean mosaic virus are not uncommon. Initial symptoms of both viruses are essentially the same. Characteristic of yellow mosaic is a conspicuous yellow mottling of the leaves. The yellow areas are scattered over the leaf blade or occur in indefinite bands along the major veins. Rusty spots later form in the yellowed areas. Veinal necrosis often occurs. Some virus strains produce severe mottling or crinkling in the leaves. Infected plants are not noticeably stunted. The virus infects a wide range of weed and crop plants. It is transmitted by several species of aphids. Seed transmission in soybean has not been reported.

10. **Bud Blight,** caused mostly by the tobacco ringspot virus, produces a variety of symptoms. The tip (terminal) bud on young plants turns brown, dies, and curves downward to form a "sheperd's crook". Later, other buds turn brown, die, and become very brittle. Diseased plants are often stunted to dwarfed, produce few or no pods, and **remain green until frost**. The pods that do form may drop early or develop dark blotches. Bud blight usually starts at a field margin and progresses inward. The causal virus infects many weed and crop plants and is transmitted by young thrips, grasshoppers, probably other insects, as well as dagger nematodes. The few seeds produced by systemically-infected plants give rise to diseased seedlings.

11. **Lighting Damage** causes soybean plants to be killed in generally circular spots, up to about 50 feet in diameter, with a border of damaged plants. Lower parts of the stems may be blackened with numerous, dead, attached leaves. Lightning can be distinguished from root rot by the sudden death of both soybeans and weeds in the affected area, the clearly defined margins, no evidence of a pathogen, and that the spot does not increase in size.

12. **Hail Injury** is easy to recongize. Leaves are ragged and torn. Stems may be "cut off," broken, or show sunken dark areas on one side. Hail injuries may be colonized later by pathogenic organisms and result in girdling cankers and/or weakened stems.

13. **Frost Damage** is most common on early-planted soybeans. Often only the upper parts of the plants in low-lying areas of fields is killed or damaged. Regrowth soon appears at a nondamaged node. If such growth is vigorous, and the number of severely damaged plants is small, replanting is not needed.

14. **Iron Deficiency** appears as a yellowing of the interveinal areas on the younger leaves. Later, even the veins may turn yellow with the whole leaf finally turning ivory-colored to almost white. Brown dead spots may form near the leaf margins. Iron deficiency, which closely resembles manganese deficiency, is common in alkaline soils, usually well above pH 7.0.

15. **Potassium Deficiency** appears as a yellow mottling to a more or less continuous, irregular yellow border around the margins of leaflets. The yellowish areas may spread inward with the older parts often turning brown. The leaf margins may cup downward. The dead tissues tend to drop away giving the leaves a ragged appearance. Symptoms first appear on the younger leaves.

For chemical and cultural control suggestions, a listing of resistant varieties and other control measures, consult the Extension Plant Pathologist at your land-grant university, or your country extension office.

Photo credits: University of Illinois (1L, 2R, 3, 4, 8C, 9, 10R, 11, 12, 14, 15), W. J. Walla (IR, 2L, 10L), R. W. Samson (5), T. M. Sjulin (6, 8L, 8R), J. T. Yorinori (7), and W. O. Scott (13).

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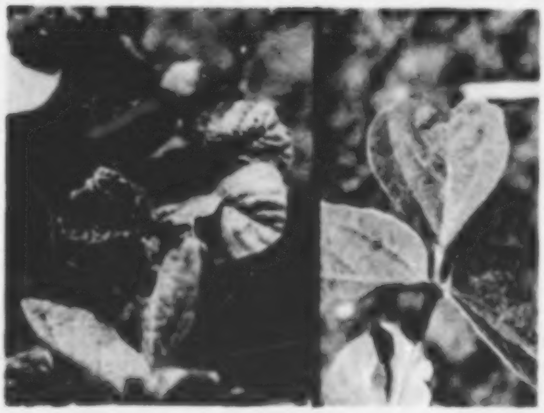
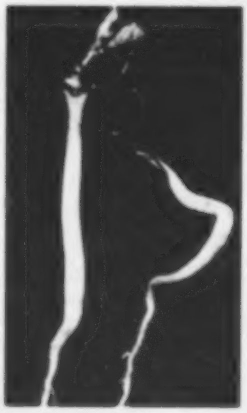
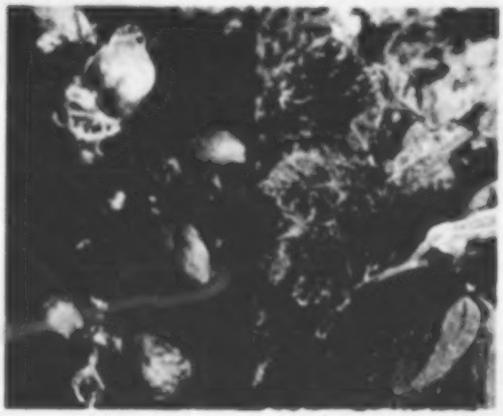
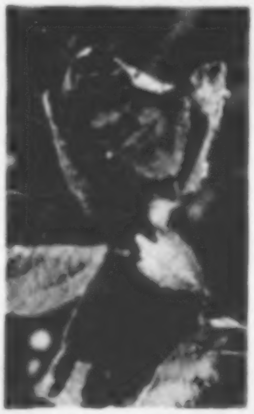
SOYBEAN HERBICIDE INJURY I

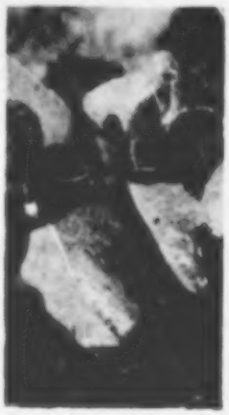

1. Acetanilide herbicide injury, preemergence


2. Dinitroaniline, preplant incorporated

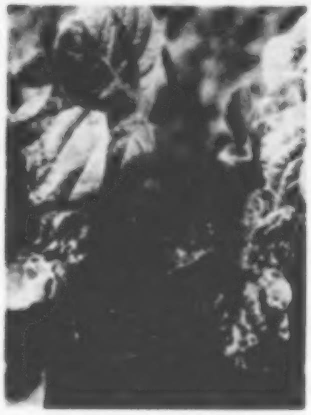
3. Pendimethalin, preemergence

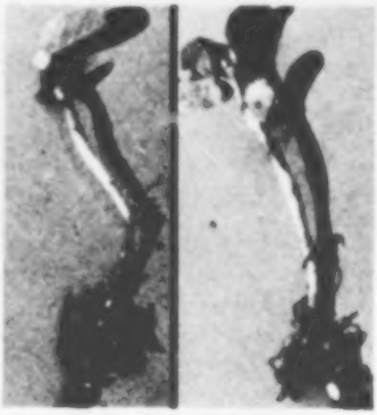

4. Vernolate, preplant incorporated

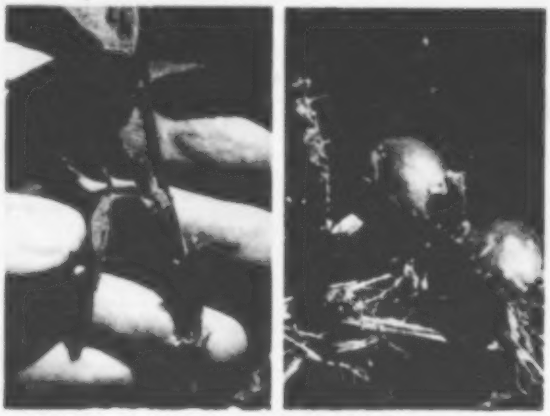

5. Linuron, preemergence


6. Metribuzin, preplant incorporated

7. Atrazine carryover


8. Bifenox, preemergence


9. Chloramben, preemergence


10. Hail injury

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

HERBICIDE INJURY NO. 3
MAY 1980
URBANA, ILLINOIS

SOYBEAN HERBICIDE INJURY I

1. Acetanilide herbicide injury, preemergence.– Misapplication of acetanilide herbicides such as alachlor (Lasso) and metolachlor (Dual) may cause a slight puckering of the first few soybean leaves. Injured plants may also have leaves showing a "drawstring effect;" the midrib of the leaf is shortened, giving the injured leaves a heart-shaped appearance.

2. Dinitroaniline herbicide injury, preplant incorporated. – Excessive rates of dinitroaniline herbicides such as trifluralin (Treflan), profluralin (Tolban), fluchloralin (Basalin), and pendimethalin (Prowl) may result in early injury denoted by pruned lateral roots, swollen and cracked hypocotyls, and stunted, crinkled leaves.

Dinitiroaniline injury can be reduced by selecting proper rates, accurate application, and uniform incorporation. Plant quality soybean seed under conditions favoring rapid emergence and vigorous early growth.

3. Pendimethalin, preemergence. – Preemergence treatments of dintroaniline herbicides such as pendimethalin (Prowl) and oryzalin (Surflan) occasionally cause symptoms of soybean injury that include girdling or callusing of plant stems at the soil surface. Stems may later lodge or easily break off at the soil surface. Injury may occur because of misapplication or where prolonged periods allow the chemical to remain in a concentrated layer on the soil surface.

4. Vernolate, preplant incorporated. – Vernolate (Vernam) is a thiocarbamate herbicide chemically related to butylate (Sutan+) and EPTC (Eradicane).

Vernam may cause early injury symptoms of stunted tops with crinkled, malformed leaves; however, plants usually outgrow the injury. Severe soybean injury called bud seal may occur from excessive rates of Vernam, or if Sutan+ or Eradicane are applied to soybeans by mistake.

5. Linuron, preemergence. – Interveinal chlorosis (yellowing) and necrosis (browning) of soybean leaves may result from preemergence treatments of linuron (Lorox). Heavy rain also may splash treated soil on to the leaves and cause necrotic spotting or "splash burn."

6. Metribuzin, preplant incorporated. – Metribuzin (Sencor, Lexone) is a triazine herbicide which is applied preemergence or preplant incorporated and may cause injury similar to linuron (No. 5). These herbicides are photosynthetic inhibitors that are taken up by the roots and may cause brown necrotic areas to develop between the leaf veins.

Older tissue usually develops the first signs of injury. However, plants can outgrow this injury if the growing points (buds) have not been injured.

7. Atrazine carryover. – Atrazine residue may cause a range of symptoms on soybean leaves, from slight mottling through necrotic areas to dead plants. Atrazine residues in combination with metribuzin may cause synergistic or additive injury for soybeans following corn.

8. Bifenox, preemergence. – Preemergence treatments of diphenyl ether herbicides such as bifenox (Modown) and oxyfluorfen (Goal) may cause early injury. Symptoms include general stunting and leaf crinkling. Heavy rain may splash treated soil on emerging leaf tissue, resulting in necrotic spotting of tissue.

9. Chloramben, preemergence. – Chloramben (Amiben) injury is not very common, but occasionally appears as stunted top growth. Examination of the plant roots will reveal a proliferation of abnormal, stubby roots from excessive chloramben accumulation in or around the seed during germination.

10. Hail injury. – Soybeans have the ability to recover from herbicide injury or stress which occurs prior to bloom and pod formation unless secondary stresses (injury, drouth) occur.

When soybeans are small, the loss of 100 percent of their leaves may result in only a 20-25 percent yield reduction. The same loss of leaves after pods are formed may cut yields by 80-85 percent.

Photo credits: Joe Paul Downs, Michael D. K. Owen, Ellery L. Knake, Marshal D. McGlamery; University of Illinois at Urbana-Champaign, Extension Agronomists.

Subject Matter: Joe Paul Downs, University of Illinois at Urbana-Champaign, Extension Agronomist, Review by Marshal D. McGlamery, Agronomy Dept., University of Illinois at Urbana-Champaign.

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Graphic Design: Martha Martin.

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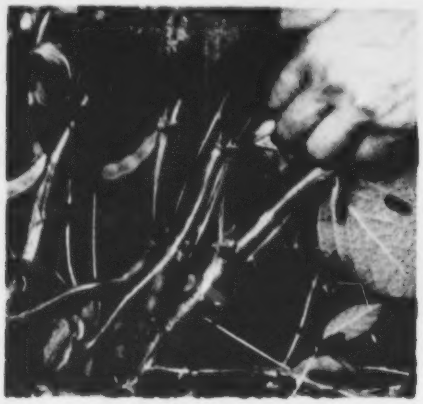
SOYBEAN HERBICIDE INJURY II

1. Bentazon, postemergence

2. Dinoseb, postemergence

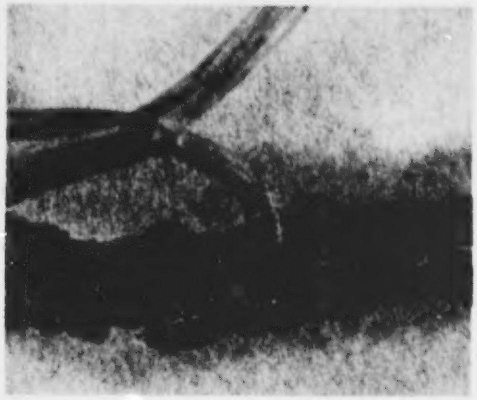
3. Acifluorfen, postemergence

4. Naptalam, postemergence

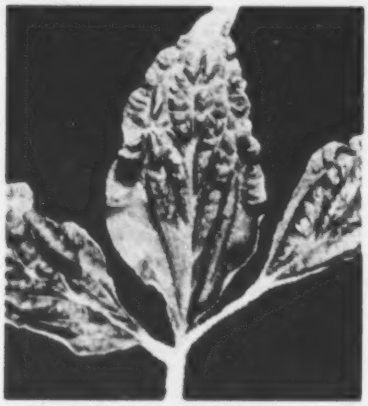


5. 2,4-DB, postemergence

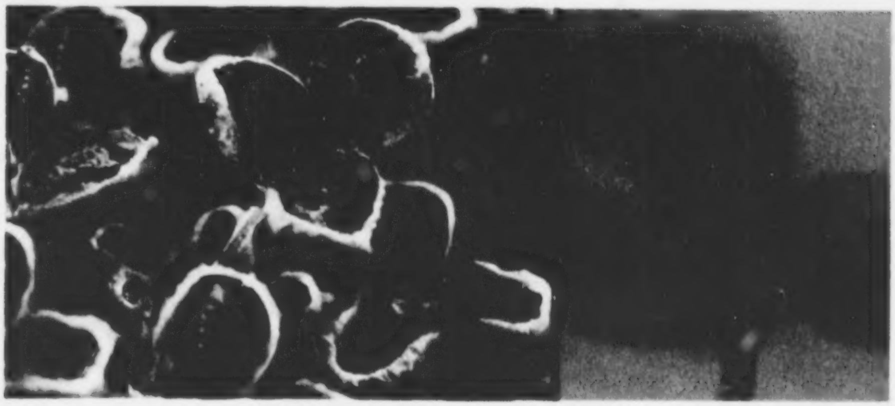
6. 2,4-D, postemergence drift



7. 2,4-D, "stem callus"



8. 2,4-D, "look-alike" injury



9. Dicamba, postemergence drift

UNIVERSITY OF ILLINOIS COLLEGE OF AGRICULTURE
COOPERATIVE EXTENSION SERVICE
and VOCATIONAL AGRICULTURE SERVICE

HERBICIDE INJURY NO. 4
MAY 1980
URBANA, ILLINOIS

SOYBEAN HERBICIDE INJURY II

1. **Bentazon, postemergence.** – Soybeans usually have good tolerance to bentazon (Basagran). Under certain stress conditions, soybean leaves may show yellowing, bronzing, speckling, or burn. The addition of crop oils to the spray may increase the risk of injury.

2. **Dinoseb, postemergence.** – Dinoseb (Premerge 3), and Dinoseb plus naptalam (Dyanap, Kleen-Krop) are sometimes applied postemergence for broadleaf weed control. If injury occurs, dinoseb will usually cause a noticeable "contact-type" leaf burn, and naptalam may cause occasional symptoms of growth-regulator-type injury.

3. **Acifluorfen, postemergence.** – Acifluorfen (Blazer) is a diphenylether herbicide applied postemergence which may cause necrotic spotting or minor burn of leaf tissue contacted by the spray. Some leaf crinkling may also occur.

4. **Naptalam, postemergence.** – Excessive rates of naptalam (Alanap) applied to soybeans may cause growth-regulator-type injury denoted by possible stunting, leaf crinkling and roots that grow up instead of down (negative geotropism).

5. **2,4-DB, postemergence.** – 2,4-DB should be applied as a post-directed spray to minimize injury. Soybean foliage injured by 2,4-DB may show signs of general wilting, curved or cracked stems, proliferated growth (protrusions) on stems, and lodging.

6. **2,4-D, postemergence drift.** – 2,4-D applied postemergence to corn may injure nearby soybeans and other desirable broadleaf plants. Symptoms of injury include puckering of leaves, parallel veination or leaf strapping, distortion of stems and callus growth.

7. **2,4-D, "stem callus."** – Early season injury to soybeans from 2,4-D or misapplication of 2,4-DB may cause stem callus growth near the soil surface which can result in soybean lodging.

8. **2,4-D, "look-alike" injury.** – A puckered, thickened leaf may characterize several virus diseases that attack soybeans; however, if broadleaf weeds also show typical 2,4-D injury symptoms, then 2,4-D is likely the problem.

9. **Dicamba, postemergence drift.** – Dicamba (Banvel) postemergence applied to corn may injure nearby soybeans and other desirable broadleaf plants. Cupped leaves, significant leaf bud clustering, and leaf puckering can help to distinguish this from 2,4-D or 2,4-DB injury.

Photo credits: Joe Paul Downs, Michael D. K. Owen, Ellery L. Knake, Marshal D. McGlamery; University of Illinois at Urbana-Champaign, Extension Agronomists.

Subject Matter: Joe Paul Downs, University of Illinois at Urbana-Champaign, Extension Agronomist, Review by Marshal D. McGlamery, Agronomy Dept., University of Illinois at Urbana-Champaign.

Graphic Design: Martha Martin.

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STUDENT WORKSHEET 1

IDENTIFICATION OF PARTS OF THE SOYBEAN SEED AND PLANT

1. Describe the functions of the seed coat

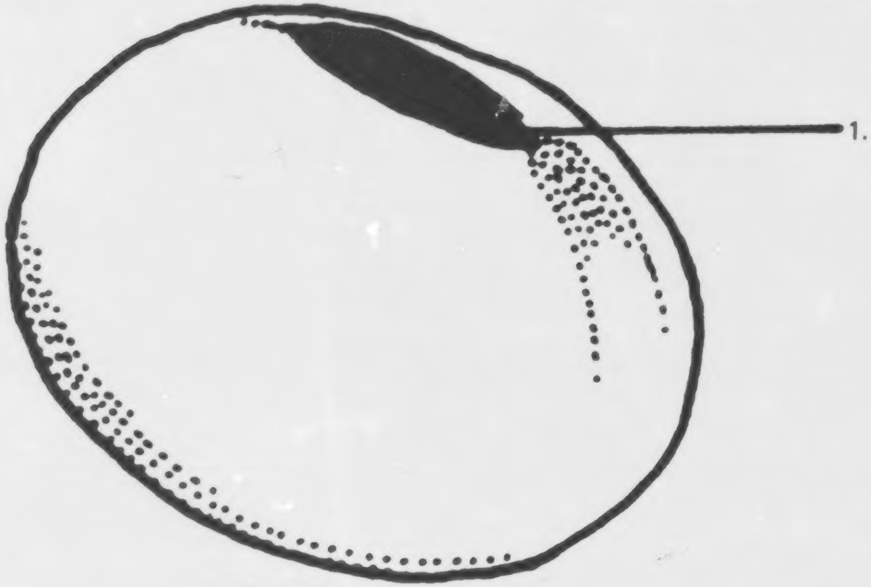
2. What do the cotyledons do?

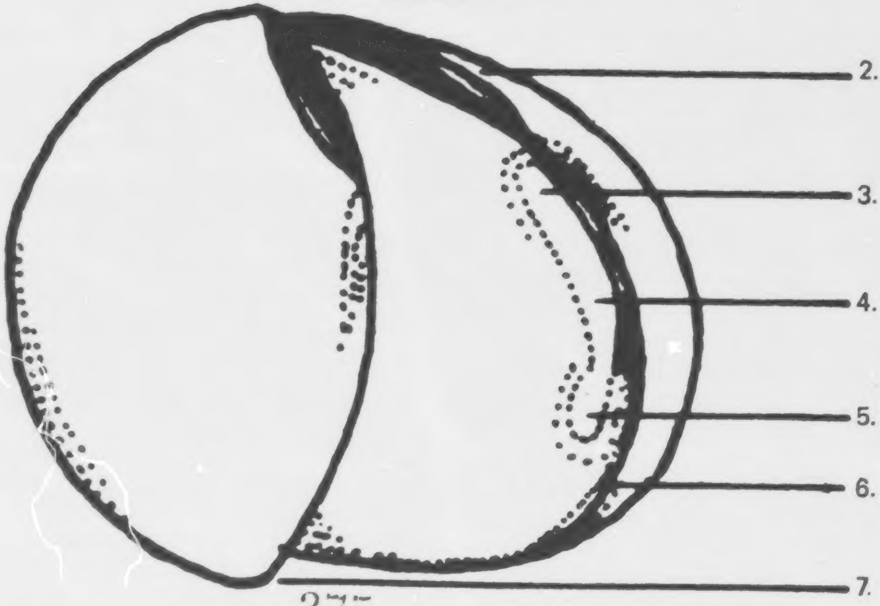
3. Where and what is the radicle?

4. The ______________________________ is the main stem and growing point of the soybean plant.

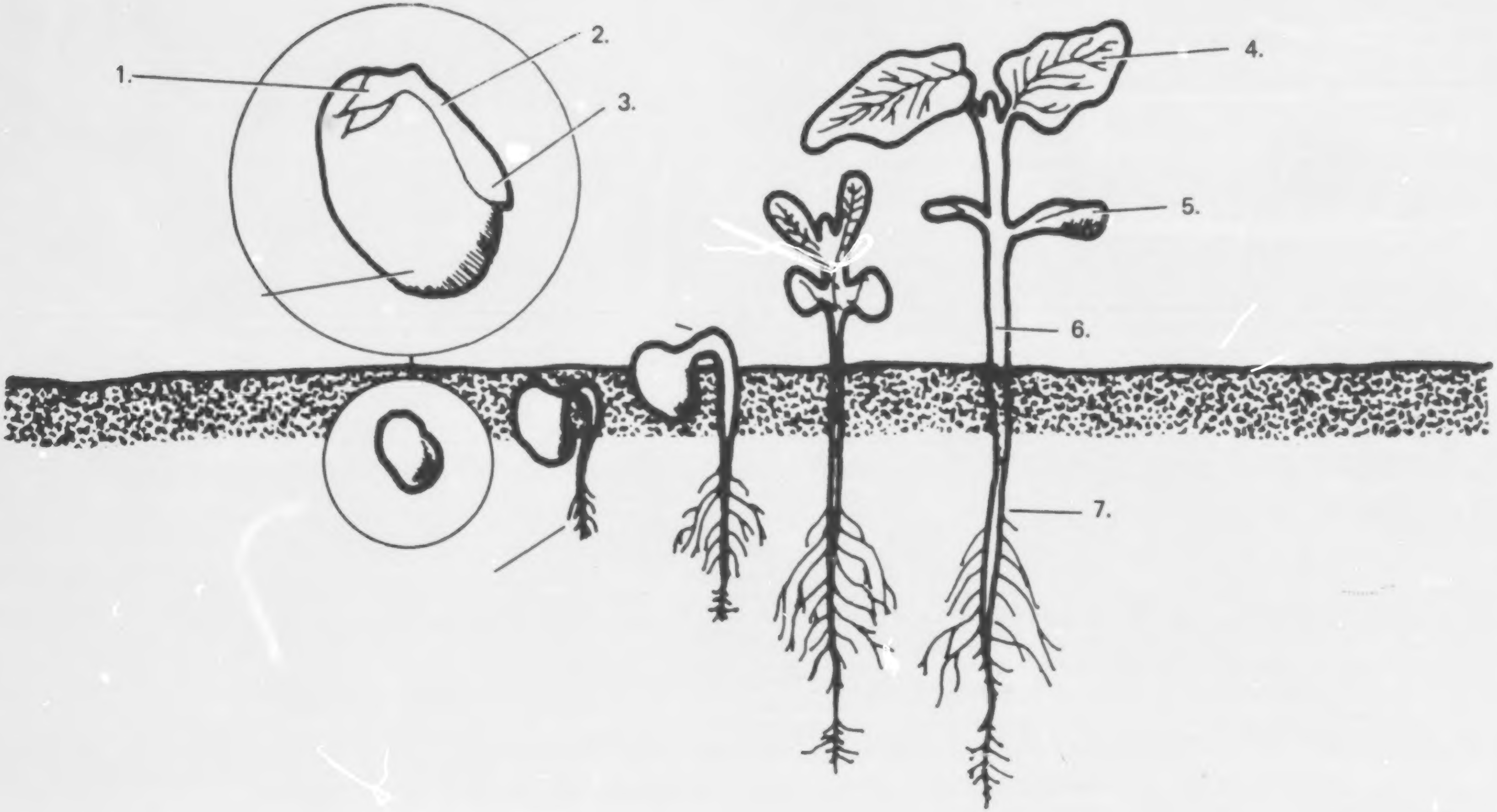
5. Identify the parts of the soybean seed and plant on the following pages.

PARTS OF A SOYBEAN SEED





GROWTH OF A DICOT SEED



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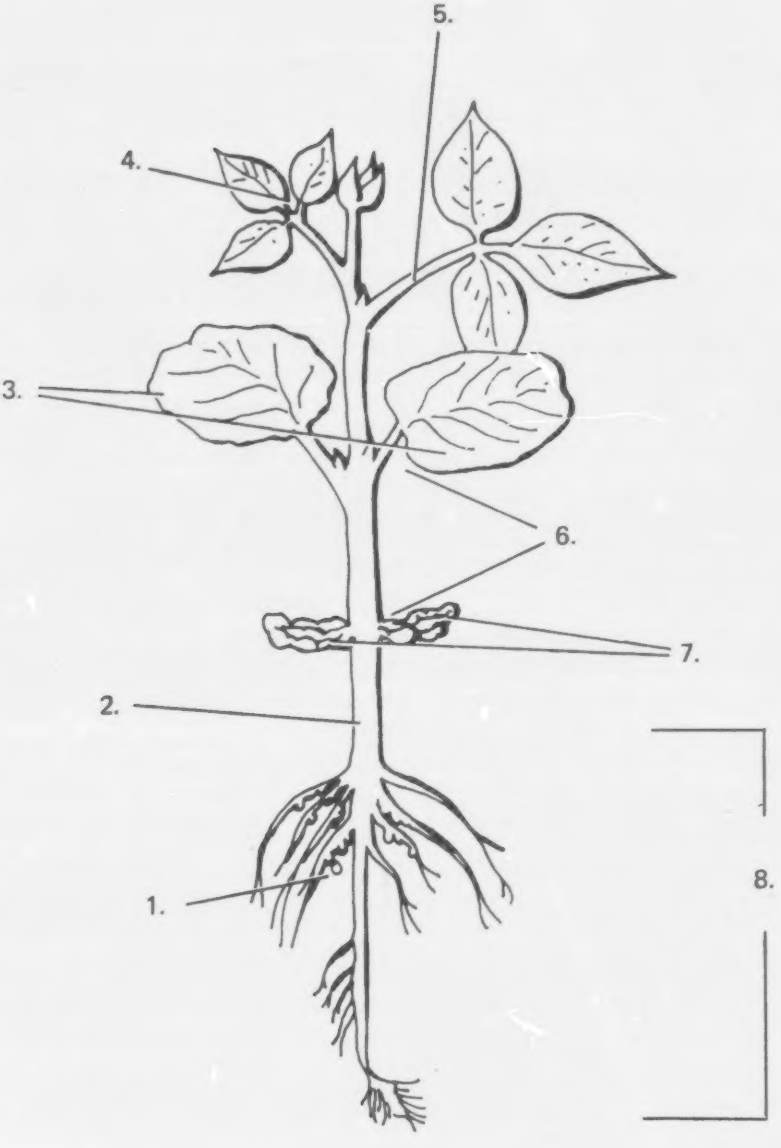
PARTS OF A YOUNG SOYBEAN PLANT



STUDENT WORKSHEET 2

PREPARING THE SEEDBED AND SELECTING A VARIETY OF SOYBEANS

1. Name the three main purposes of tillage.

   a. ____________________

   b. ____________________

   c. ____________________

2. Identify and describe the characteristics of a good seedbed.

   a. ____________________

   b. ____________________

   c. ____________________

   d. ____________________

   e. ____________________

   f. ____________________

   g. ____________________

3. Compare advantages and disadvantages of: (refer to VAS4033a, page 3)

   a. Conventional tillage:

   b. Minimum tillage:

   c. No-till:

4. List the eight functions of tillage operations.

a. ____________	e. ____________
b. ____________	f. ____________
c. ____________	g. ____________
d. ____________	h. ____________

5. Name six characteristics of a good soybean variety.

a. ______________________ d. ______________________

b. ______________________ e. ______________________

c. ______________________ f. ______________________

6. Identify the common varieties of soybeans used in your region of Illinois.

Variety	Maturity Group and Date	Characteristics of Seed and Plant	Yield Obtained in Research or in Community

STUDENT WORKSHEET 3

PLANTING AND GROWING SOYBEANS

1. The month of ____________________ is best for planting soybeans.

2. Give the information needed on planting population:

Row width	Plants/ft. of row
40"	____________
________ "	6–8
20"	____________
________ "	3–4

3. What are the effects if planting soybeans too deep?

4. What factors should be considered when converting to narrow rows?

5. Fill in the nutrients required for the following yields:

Nutrients	25 bu. yield per acre	50 bu. yield per acre
Nitrogen	______________	______________
Phosphate	______________	______________
Potash	______________	______________
Sulphur	______________	______________
Magnesium	______________	______________
Calcium	______________	______________

6. Do you need to apply nitrogen for soybeans? Why? Why not?

7. How can you determine the correct amounts of fertilizer to apply to your field?

8. When and why do you use the rotary hoe?

STUDENT JOB SHEET 1

PLANTING SOYBEANS FOR CLASSROOM DEMONSTRATIONS

Objectives:

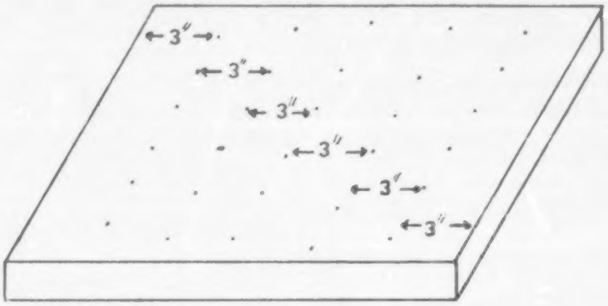
1. To understand how planting depth effects germination.
2. To become familiar with the parts of a young soybean plant.
3. To determine the effects of various herbicides on the soybean plant.

Materials:

1. Growing flat approximately 12" W x 18" L x 5" D.
   (Can construct a growing flat by using VAS Unit 3052, Constructing a Woodworking Project.)
2. Growing media.
3. Soybean seed.

Procedures:

1. Place ½" of soil or growing media in the flat and plant one row of soybean seed. (Plant same number of seeds in each row.)
2. Add 1" of soil or growing media and plant a second row of soybeans.
3. Add 1" of soil or growing media – plant a third row of soybeans.
4. Continue planting sequence until the last row is planted ½" deep.



5. Tightly pack the soil on ½ of each row.
6. Have students care for flat and keep a daily record of the germination rate and time per row, and the growth and development of the plants. The students should also identify any weeds germinating in the flat.

Questions:

1. Which row had the highest germination rate? ______________________________

2. Which row germinated first? __________________ Last? __________________

3. What effect did the packing of the soil have on germination time? ______________

   On % germination? ______________________________

   Why? ______________________________

4. What happend to the cotyledons? ______________________________

   __________________ Why? __________________

   ____

Observation: Record the following information:

1. Time of germination per row.
2. Time of germination on packed and unpacked rows.
3. Characteristics of first leaves to appear (sketch plant).
4. Characteristics of plant from germination through Stage 1.

Conclusions:

Discuss the results as they would apply to planting soybeans in the field on your S.O.E. project (approved practices).

STUDENT JOB SHEET 2

DETERMINING HERBICIDE EFFECTS ON SOYBEANS

Objectives:

1. To determine how herbicides can injure soybean plants
2. To be able to recognize and describe the various herbicide injuries
3. To understand the proper safety procedures to follow in using and handling herbicides

Materials:

1. Soybean plants in a growing flat
2. Mixtures of various herbicides–grass and broadleaf
3. Eyedropper for each herbicide
4. Following references from Vocational Agriculture Service, University of Illinois
    a. Agronomy Handbook
    b. Soybean Herbicide Injury Sheets I and II
    c. Soybean Problem Series I, Planting to Emergence; and II, Emergence to Flowering
5. Labels for each herbicide used

Procedures:

1. Using one herbicide per plant, place three drops of each herbicide on the growing point and three drops on one leaf of a soybean plant.
2. Observe and record the effects of each brand of herbicide on the plants daily.
3. Record the safety procedures printed on the labels of each herbicide used.

Questions:

1. What was the effect of placing the herbicide on the growing point? ____________________

    ____

    On the leaf? ____________________________________

    ____

2. How long did it take for the effects to start? ______________________

    ____

3. Did all herbicides cause injury? ______________________________

Why? Why not? ______________________________

4. What is the proper way to handle herbicides? ______________________________

____

____

Observation:

Record daily observations

Conclusions:

Discuss the results as they would apply to selecting and using herbicides in the field on your S.O.E. project.
(approved practices)

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TEACHER'S KEY
STUDENT WORKSHEET 1

IDENTIFICATION OF PARTS OF THE SOYBEAN SEED AND PLANT

1. Describe the functions of the seed coat.

   Protects embryo from fungi and bacteria.

2. What do the cotyledons do?

   Supply food to seedling plant.

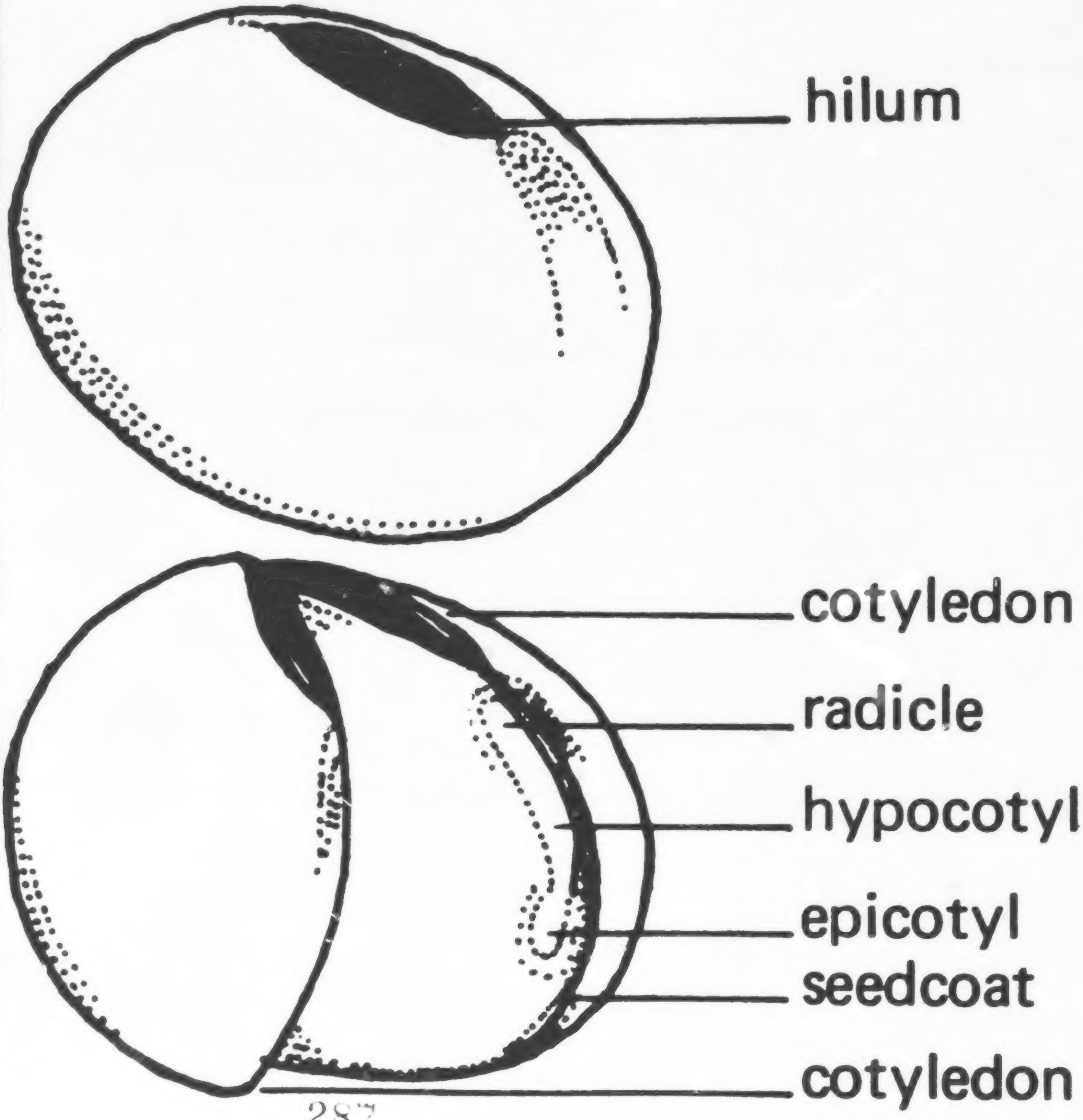
3. Where and what is the radicle?

   Primary (radicle) root of the plant.

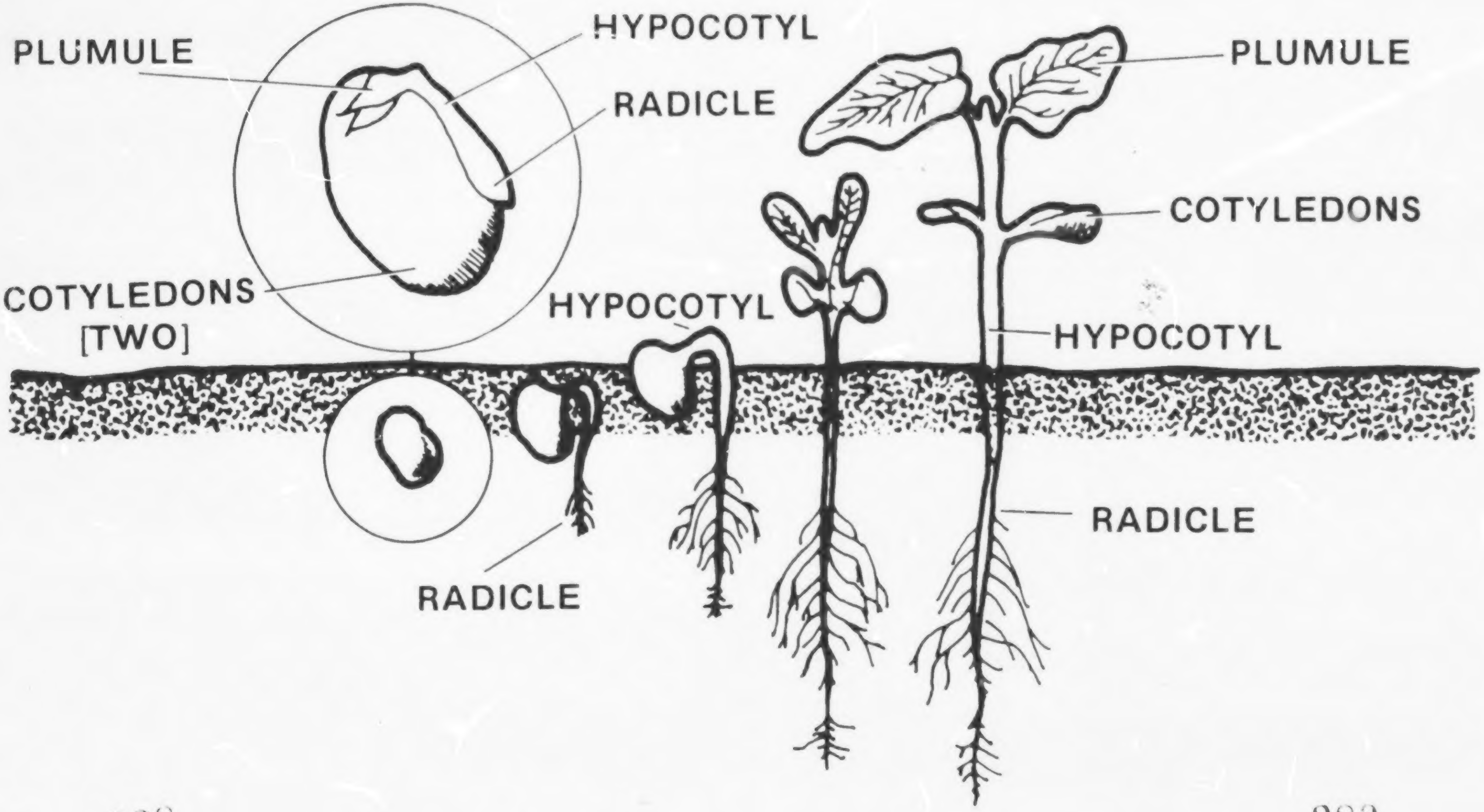
4. The ____hypocotyl____ is the main stem and growing point of the soybean plant.

5. Identify the parts of the soybean seed and plant on the following pages.

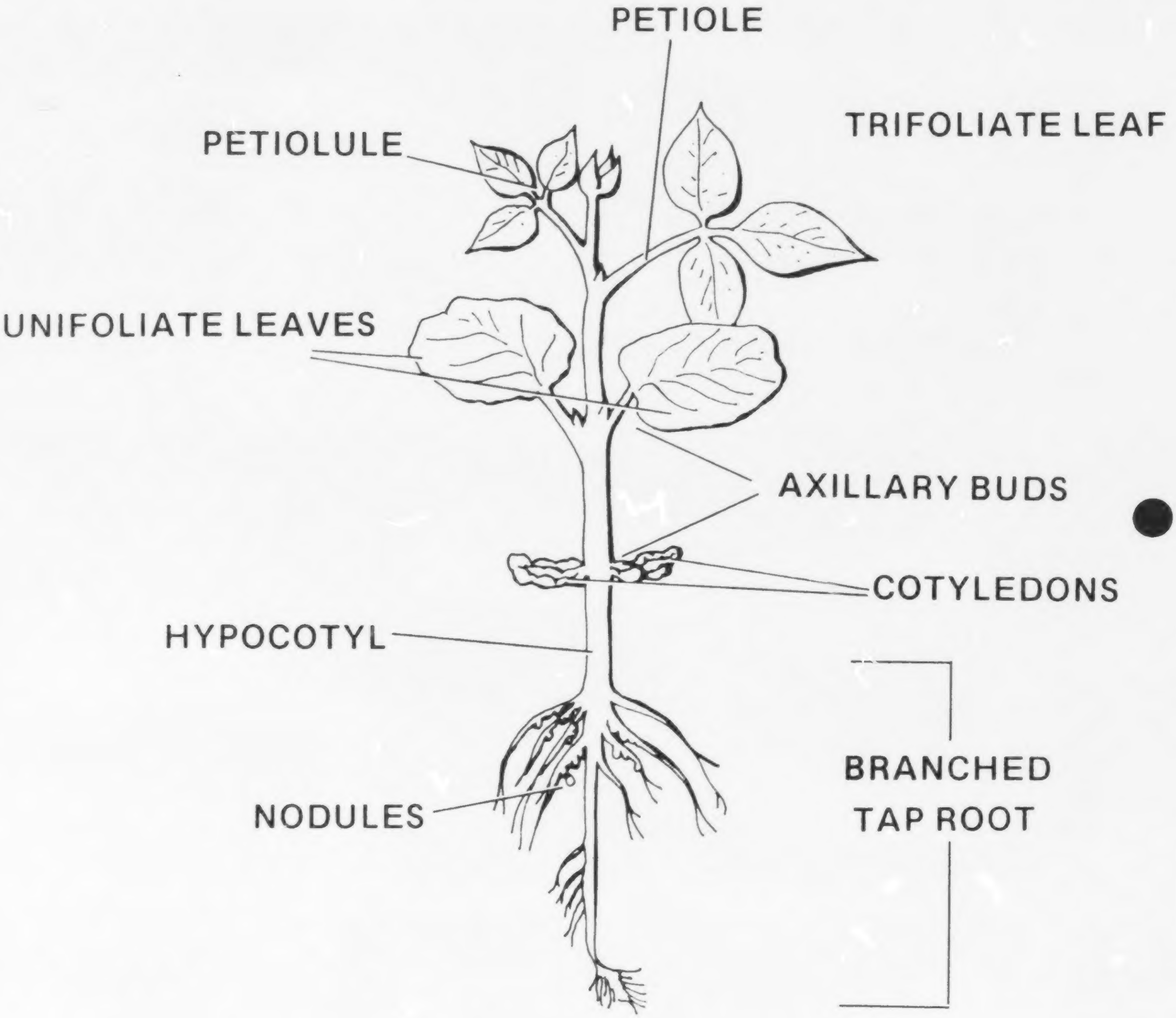
PARTS OF A SOYBEAN SEED



GROWTH OF A DICOT SEED



PARTS OF A YOUNG SOYBEAN PLANT



TEACHER'S KEY
STUDENT WORKSHEET 2

PREPARING THE SEEDBED AND SELECTING A VARIETY OF SOYBEANS

Source: 4033a and Planting and Harvesting Transparencies

1. Name the three main purposes of tillage.

   a. Prepare good seedbed

   b. Eliminate weed competition.

   c. Improve condtions of soil

2. Identify and describe the characteristics of a good seedbed.

   a. Fine, pulverized

   b. Firm

   c. Loose and mellow

   d. Free of trash and weeds

   e. Fertile

   f. Free of insects

   g. Free of plant diseases

3. Compare advantages and disadvantages of: (refer to VAS4033a, page 3)

   a. Conventional tillage:

   b. Minimum tillage:

   c. No-till:

4. List the eight functions of tillage operations.

a. Manage crop residue	e. Insect control
b. Aerates the soil	f. Improve soil tilth
c. Control weeds	g. Seed-soil contact
d. Moisture management	h. Erosion control

5. Name six characteristics of a good soybean variety.

a. Proper maturity
b. Lodging resistance
c. Disease resistance
d. Shatter resistance
e. Seedling vigor
f. Yield potential

6. Identify the common varieties of soybeans used in your region of Illinois.

Variety	Maturity Group and Date	Characteristics of Seed and Plant	Yield Obtained in Research or in Community

TEACHER'S KEY
STUDENT WORKSHEET 3

PLANTING AND GROWING SOYBEANS

1. The month of May is best for planting soybeans.

2. Give the information needed on planting population:

Row width	Plants/ft. of row
40"	10 – 12
30 "	6–8
20"	4 – 6
10 "	3–4

3. What are the effects if planting soybeans too deep?

Slow emergence, which increases danger of disease and insect damage.

4. What factors should be considered when converting to narrow rows?

a. Weed control b. Investment in equipment
c. Adaptability of varieties d. Controlling population

5. Fill in the nutrients required for the following yields:

Nutrients	25 bu. yield per acre	50 bu. yield per acre
Nitrogen	180	256
Phosphate	20	48
Potash	80	185
Sulphur	10	15
Magnesium	15	18
Calcium	40	48

6. Do you need to apply nitrogen for soybeans? Why? Why not?

Only limited quanity as starter fertilizer.

7. How can you determine the correct amounts of fertilizer to apply to your field?

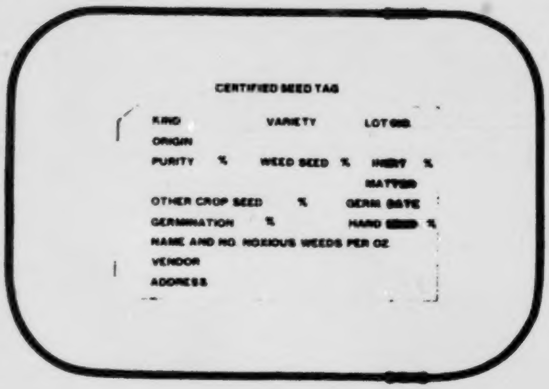
Soil testing.

8. When and why do you use the rotary hoe?

a. Early cultivation; b. Break up crush; c. Control weeds

Can be hoed after sprouting until they are 3" – 4" high.

GROWING SOYBEANS



CERTIFIED SEED TAG

KIND VARIETY LOT NO.
ORIGIN
PURITY % WEED SEED % INERT MATTER %
OTHER CROP SEED % GERM DATE
GERMINATION % HARD SEED %
NAME AND NO. NOXIOUS WEEDS PER OZ.
VENDOR
ADDRESS

1. To be certain that a variety is true to name, it is best to use seed which is certified.

Seed which is certified will bear a label which is similar to the one shown. All of the information would be included on the tag so you would know exactly what you were planting.

Variety — The type or subdivision of soybean species that you have.

Lot number — Limited to 5000 bushels of seed. Seed of the same species and variety, grown in different fields but mixed to form a "lot".

Pure Seed — The percentage of seed that will produce plants true to variety and type.

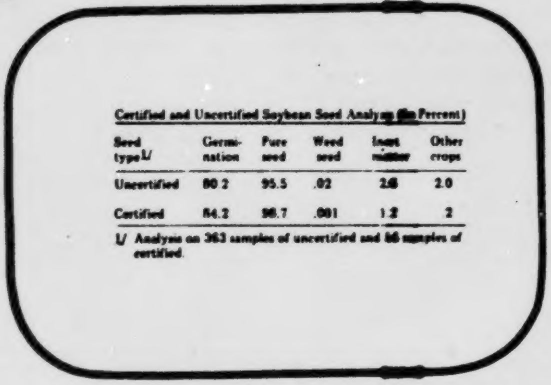
Inert Matter — The percentage by weight of chaff, broken seeds, stems and soil particles.

Weed seeds — The percentage by weight of seeds that are considered weeds.

Other Crop Seed — The percentage by weight of seeds not of the specified variety.

Germination — The percentage of seeds that will produce normal plants under normal conditions.

Hard Seeds — The percentage of seeds which remain hard and sound at the end of a germination period.



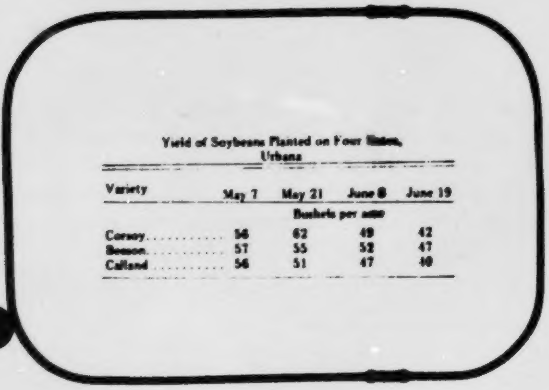
Certified and Uncertified Soybean Seed Analyses (In Percent)

Seed type[1]	Germination	Pure seed	Weed seed	Inert matter	Other crops
Uncertified	80.2	95.5	.02	2.6	2.0
Certified	84.2	98.7	.001	1.2	2

[1] Analysis on 363 samples of uncertified and 86 samples of certified.

2. In order to ensure a good crop, you must do a good job of selecting seed. Samples of soybean seed were checked and the analysis showed that farmers who purchased certified seed obtained a higher quality seed on the average than farmers purchasing uncertified seed.

This evidence indicates that the Illinois farmer could improve the potential of his soybean production by using higher quality seed.



Yield of Soybeans Planted on Four Dates, Urbana

Variety	May 7	May 21	June 8	June 19
	Bushels per acre			
Corsoy	56	62	49	42
Beeson	57	55	52	47
Calland	56	51	47	40

3. Soybeans should be planted in May. The full season varieties will yield best when planted in early May. Earlier varieties often yield more when planted in late May than in early May.

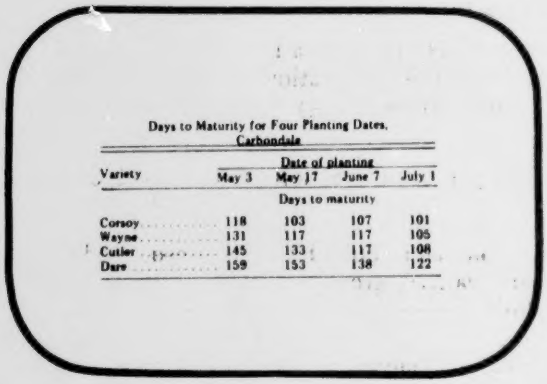
In tests conducted at Urbana, three varieties common to the area were planted on four dates. The resulting yield figures demonstrate that early or mid-May planting can have a dramatic impact on the amount produced.

4. This chart gives an idea of the relative number of days it takes for soybeans to mature, when planted on different dates.

The vegetative stage, from planting to the beginning of flowering, is 45 to 60 days for full-season varieties planted at the normal time. This period is shortened as planting is delayed and may be only 25 days when these varieties are planted in late June or early July.

Soybeans are photoperiod responsive and the length of the night or dark period is the main factor in determining when flowering begins. The length of the flowering period and that of pod filling also are shortened as planting is delayed. As the length of the vegetative period grows shorter, the number of days it takes soybean plants to mature becomes fewer.

Soybeans are ready for combining when the plants have dropped their leaves, the pods are dry, and the beans contain less than 13 percent moisture if stored without use of artificial drying.

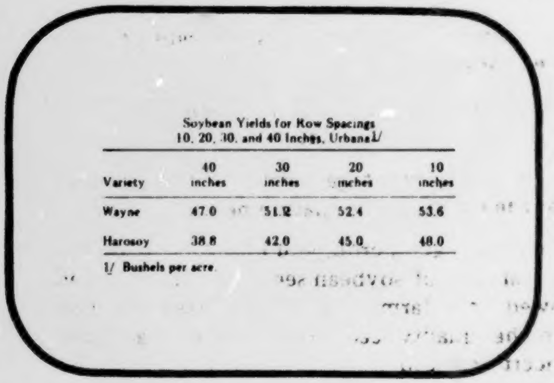


Days to Maturity for Four Planting Dates, Carbondale

Variety	Date of planting			
	May 3	May 17	June 7	July 1
	Days to maturity			
Corsoy	118	103	107	101
Wayne	131	117	117	105
Cutler	145	133	117	108
Dare	159	153	138	122

5. For highest yields, plant in as narrow row spacing as you can use and still get satisfactory weed control. This usually means planting in rows as close together as you can cultivate.

Maximum yields are obtained in row spacings narrower than 40 inches. Compared with 40-inch rows, narrowing to 30 inches boosts yields about 10 percent; reducing row width to 20 inches increases yields about 15 percent; and yields in 10 inch rows are increased by about 15 to 25 percent, as shown in the table.

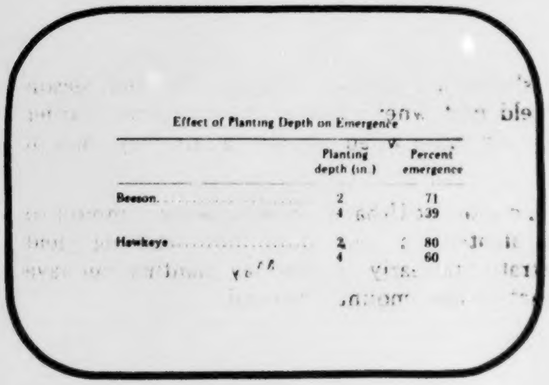


Soybean Yields for Row Spacings 10, 20, 30, and 40 Inches, Urbana1/

Variety	40 inches	30 inches	20 inches	10 inches
Wayne	47.0	51.2	52.4	53.6
Harosoy	38.8	42.0	45.0	48.0

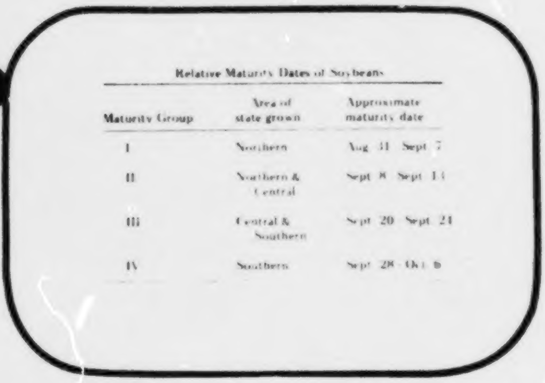
1/ Bushels per acre.

6. Emergence will be more rapid and stands will be more uniform if soybeans are planted only 1½ to 2 inches deep. Deeper planting often results in disappointing stands. Varieties differ in their ability to emerge when planted more than 2 inches deep, as the table shows. Therefore, special attention should be given to the planting depth of soybeans.



Effect of Planting Depth on Emergence

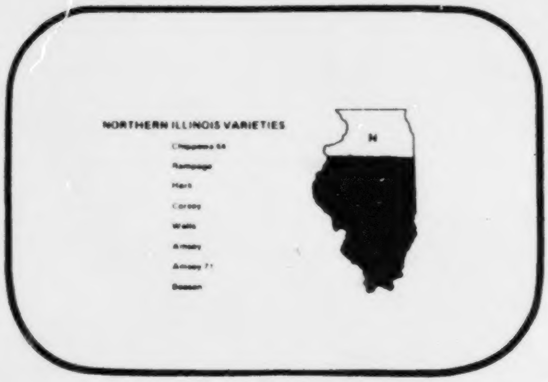
	Planting depth (in.)	Percent emergence
Beeson	2 4	71 39
Hawkeye	2 4	80 60



Relative Maturity Dates of Soybeans

Maturity Group	Area of state grown	Approximate maturity date
I	Northern	Aug. 31 - Sept. 7
II	Northern & Central	Sept. 8 - Sept. 13
III	Central & Southern	Sept. 20 - Sept. 21
IV	Southern	Sept. 28 - Oct. 6

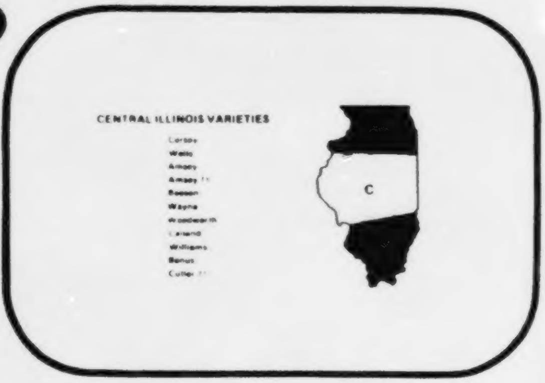
7. Shown here are the relative maturity dates for soybeans, and the area of the state in which each maturity group is grown. Group I varieties are grown in northern Illinois, while Group IV varieties are grown in the southern part of the state. The approximate date of maturity for the different groups is between August 31 for Group I and October 6 for Group IV.



NORTHERN ILLINOIS VARIETIES

Chippewa 64
Rampage
Hark
Corsoy
Wells
Amsoy
Amsoy 71
Beeson

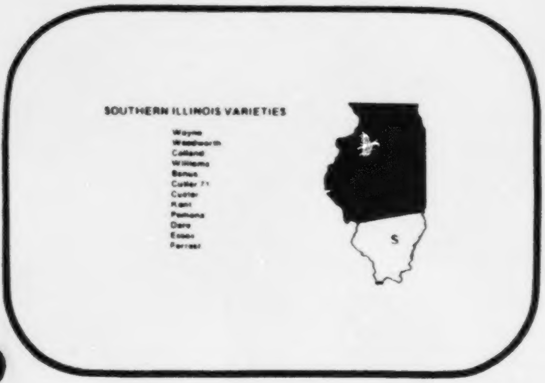
8. Soybean varieties recommended for northern Illinois farmers are listed. Arranged from earliest to latest in maturity, they are: Chippewa 64, Rampage, Hark, Corsoy, Wells, Amsoy, Amsoy 71, and Beeson.



CENTRAL ILLINOIS VARIETIES

Corsoy
Wells
Amsoy
Amsoy 71
Beeson
Wayne
Woodworth
Calland
Williams
Bonus
Cutler 71

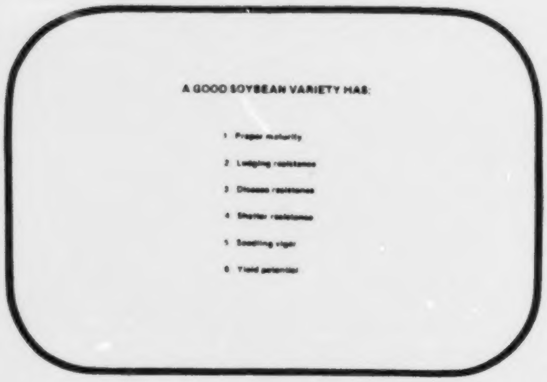
9. Soybean varieties recommended for central Illinois farmers, listed from earliest to latest in maturity, are: Corsoy, Wells, Amsoy, Amsoy 71, Beeson, Wayne, Woodworth, Calland, Williams, Bonus, and Cutler 71.



SOUTHERN ILLINOIS VARIETIES

Wayne
Woodworth
Calland
Williams
Bonus
Cutler 71
Custer
Kent
Pomona
Dare
Essex
Forrest

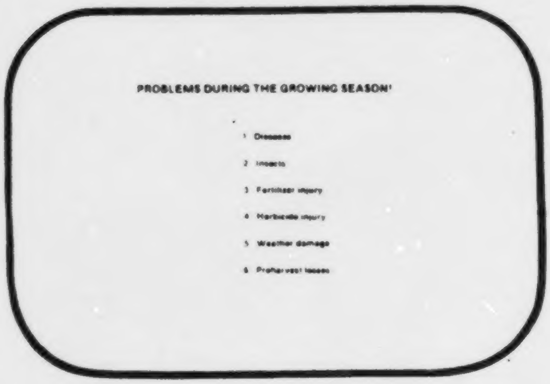
10. Varieties recommended for southern Illinois are listed from earliest to latest in maturity. They are Wayne, Woodworth, Calland, Williams, Bonus, Cutler 71, Custer, Kent, Pomona, Dare, Essex, and Forrest.



A GOOD SOYBEAN VARIETY HAS:

1. Proper maturity
2. Lodging resistance
3. Disease resistance
4. Shatter resistance
5. Seedling vigor
6. Yield potential

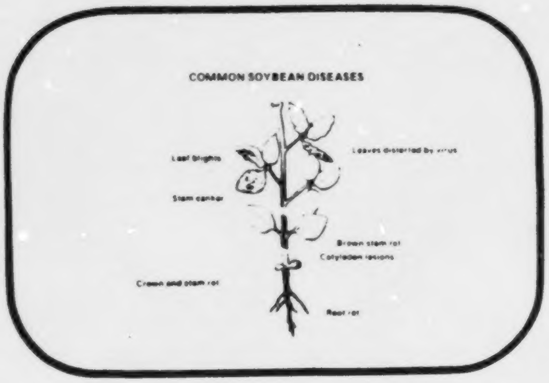
11. The initial step in good soybean production is selection of the right variety. It should be of the proper maturity for the area; have lodging resistance; shatter resistance; seedling vigor; and yield potential. Soybean varieties are divided into maturity groups according to their relative time of maturity.



PROBLEMS DURING THE GROWING SEASON[1]

1. Diseases
2. Insects
3. Fertilizer injury
4. Herbicide injury
5. Weather damage
6. Preharvest losses

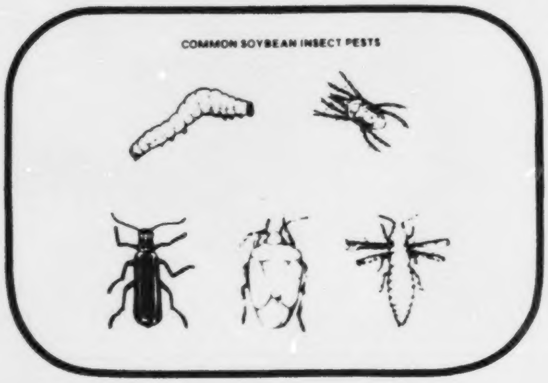
12. During the growing season, the soybean can be affected by any one of a number of different problems. Diseases, insects, fertilizer and herbicide injury, weather damage, and losses prior to harvest can all contribute to a disappointing crop. Avoiding some of these problems and being prepared to meet others can improve the situation.



COMMON SOYBEAN DISEASES

13. Although a dozen diseases are likely to occur in any soybean producing area during a growing season, most of them will not be severe enough to cause a major loss, if the best adapted varieties are grown.

Common diseases in Illinois which occur at different times during the season, are associated with leaf blights, stem canker, leaf virus, stem and root rot, seed stain, or leaf spot. The most effective means of control are: planting resistant varieties of vigorous, crack-free, certified seed; careful seed handling; seed inoculation; removal of previous crop's residue; and planting in a warm, well-drained soil.



COMMON SOYBEAN INSECT PESTS

14. Insects affecting soybeans can be grouped in four categories: soil insects attacking the seed and root, stem feeders, forage feeders, and pod feeders. The most apparent damage is caused by forage feeders but the soybean plant has a remarkable ability to minimize losses from partial leaf area destruction. Pod feeders, such as stink bugs, cause damage often affecting the market grade of the bean. Beetles, rootworms, thrips and maggots are all common insect pests in Illinois.

The best methods of control are: inoculation of the soybean seed prior to planting, and the use of insecticide when the pests first appear.

TEACHER'S KEY
SAMPLE TEST QUESTIONS

GROWING SOYBEANS

True or False

+ 1. Pound for pound, the soybean seed contains more protein than beef.

0 2. The radicle becomes the primary stem of the plant.

0 3. For maximum germination soybeans should be planted no shallower than 2½".

+ 4. The seedbed should contain adequate moisture for seed germination and plant growth.

+ 5. Plowing is effective in controlling diseases and insects.

+ 6. Minimum tillage works well with medium to coarse textured soils.

+ 7. Response to day length determines whether a variety is early or late in maturity.

0 8. Group IV varieties will mature earlier than Group II varieties.

0 9. Soybeans should be planted in April.

0 10. Soybeans do not use nitrogen.

Completion

11. The seedcoat protects the embryo from fungi and bacteria.

12. The plumule consists of a miniature stem and two leaves.

13. One of the main purposes of tillage is to prepare a good seedbed.

14. Minimum tillage reduces wind or water erosion and is an important part of conservation tillage.

15. The main advantage of zero tillage is that it permits row crops to be grown on steep slopes.

16. The only accurate way to determine the correct amount of fertilizer to apply is through a soil test.

17. Northern Illinois uses Group I varieties of soybeans.

18. The hilum is the seed scar or "eye" of the seed.

19. The Group III & IV varieties are grown primarily in the central and southern part of Illinois.

ESSAY (Answers will depend on class discussion and conclusions.)

20. What is the goal of any method of good tillage?

21. Discuss the factors which influence the decision to convert to narrow row soybeans.

22. What factors are considered in determining the planting depth of soybeans?

23. Which tillage method (conventional, minimum or zero-till) would you use to plant soybeans? Why?

    What factors are to be considered?

24. What factors should be considered when selecting a variety of soybeans?

25. What are some common problems that can occur during the growing season of soybeans?

26. Draw a soybean seed and identify the following: (hilum, cotyledon, seedcoat, and hypocotyl)

27. Draw a soybean plant and identify the following: (radicle, hypocotyl, cotyledons, plumule)

28. Describe how you would control for the following pests in your soybean field; consider time and method of application.

    a. Weeds

    b. Insects